AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION

VOLUME 24 NEW YORK AND LONDON NUMBER 42

Published at 218 William St., New York, every Thursday by the

American Machinist Press.

[INCORPORATED.]

Also published at 34 Norfolk St., Strand, London, W. C.

Correspondence on mechanical subjects solicited. Name and address must always be given—not necessarily for publication.

Address all business communications to the American Machinist Press. Matter for reading columns may be addressed to the Editor.

Subscribers can have address changed at will. Give old and new addresses. Date on wrapper denotes end of month in which subscription expires.

Subscription Price:

$4 per year, postage prepaid, to any post office in the world. No back numbers beyond current year. For sale by newsdealers, generally.

Subscription agent for Denmark, Norway and Sweden, V. Lowener, Copenhagen. Subscription agent for Germany, Austria and Holland, Gustav Diechmann & Sohn Neue Promenade 4, Berlin. Subscription agent for Spain, J. F. Villalta, Puertaferrisa, 7 9 Barcelona.

Entered at New York P. O. as mail matter of the second class.

Cable address, "MACHINIST," N Y.
Lieber's and A B C Codes.

The Proposed Increase in Annual Dues by the American Society of Mechanical Engineers.

We are in receipt of a circular issued by the council to the members of the American Society of Mechanical Engineers for the purpose of acquainting them with the financial condition of the society and with its need of a larger revenue. At a later date reply blanks are to be sent out, in order that all members may express themselves on the subject.

In this the council has done all that it could do in the circumstances. The constitution vests the right to change the dues with the members present at a meeting, and the informal mail ballot to be taken can thus be but an expression of opinion which the members present may constitutionally treat as they please. The mail ballot is to be taken in order that those present may be informed of the views of those not present, and we do not doubt that these views will be properly respected. However this may turn out, the council has done its full duty in the matter.

The subject of enlarging the housing of the society occupies a less prominent place as a reason for increasing the dues than has been generally supposed. The plain fact is, in the words of the circular, that "for the last three years the society has not been able to meet its total expenditure from *dues only*. It has only kept its head above water by other sources of income, such as sale of its publications to outsiders and by applying a portion of the initiation fees each year to current expenses." After presenting the situation the circular concludes by saying: "It will be apparent that the broad question is that of increasing the dues on the one side or of curtailing the expenditure of the society and reducing the benefits to its membership upon the other."

The circular points out the liberal policy of the society in the matter of its publications, and suggests lines of retrenchment in expenses which may be adopted. Among these are the reading of papers from manuscript, instead of distributing advance printed copies of the papers, the printing of a smaller edition for the use of those only who are present at meetings, or the charging of members for their pamphlet copies. A reduction in the number and quality of the illustrations in the Transactions, the printing of the catalog but once a year, with a half-yearly appendix of new names, and the discontinuance of the vest-pocket edition of the catalog and of the system of registration at meetings, are also suggested. We should be sorry to see any of these things done, except the discontinuance of the vest-pocket catalog, which we have never considered of much importance.

The proposed increase is, however, much more than is necessary to cover any existing deficit, and the circular proceeds to indicate directions in which more money could be profitably spent. Among these are the conduct of investigations and researches by committees of experts, the preparation and distribution of technical index material, a system of circulation of books from the library and the increase of the library.

The inadequacy of the present house is pointed out, but no definite plan of procedure is advised. The scheme of joint occupancy of a house with other societies is thus referred to: "Whether or not it shall prove desirable in the near future to alter or enlarge our present building, or build a new and more suitable one, or enter into a species of federation with one or more sister societies or to form some satisfactory scheme of joint occupancy which shall not introduce the difficulties of joint ownership—the fact remains that *any* change from the present scale of expenditure to that larger scale which the growth and importance of the society demands must make it necessary that an increase in resources should be secured."

We have looked upon and presented the scheme of joint occupancy as a measure of economy. The Civil Engineers maintain their present handsome quarters on dues of $15 a year, with an extra charge to resident members, and it would seem plain that the two societies could do better than one.

The circular takes issue—not in form, but in fact—with "Engineering News" on the amount of dues charged by the (British) Institution of Civil Engineers. "Engineering News" states this charge to be $15, with $5 added for members resident within ten miles of London, while the present circular states these dues to be four guineas a year—which in the absence of qualifications we must take to mean to all members, resident and non-resident alike.

The council are agreed that the increase is best, and in this the ex-presidents concur.

The Street Railway Men's Visit to the Bethlehem Steel Works.

A most satisfactory climax to the recent convention of the American Street Railway Association, which was held in Madison Square Garden in this city on October 9-11 was the magnificent entertainment provided by the Bethlehem Steel Company, of South Bethlehem, Pa. This comprised a visit to the works and a full opportunity to see its various departments in operation, everything pertaining to the trip being provided by the company and directed throughout by Mr. H. F. J. Porter, their popular New York representative, with two untiring assistants. A special train of five coaches made the run to South Bethlehem in a little over two hours and upon its arrival there an observation train of open cars, drawn by one of the locomotives of the works, was backed up to the rear of the train, and the passengers were soon seated for the trip with a printed program of what was to be seen in their hands, and with several men distributed on the cars to give all desired information. As the train proceeded through the works various signs at different points indicated operations in progress or pieces of work to be observed.

We can only briefly sketch the incidents of the passage through the works. First was passed without entering rolling mill No. 2 of the company, in which rolled shapes of high-grade steel are produced. Then next was a large old stone building occupied by the drafting department, with

the windows full of young and smiling draftsmen. The train then passed through one end of the old mill No. 1, in which high-grade blooms, billets and merchant bars are rolled, and after that the blast furnaces were passed. A large ladle filled with the molten metal was just being drawn away by a little locomotive, while a second ladle was being filled. As the train was in the bright sunlight, while the furnace was tapped under cover, the full effect of the brilliant pyrotechnic display was hardly realized. The train followed the ladle of molten metal to the pig-casting machine. The molds are arranged radially and close together on an elevated turntable as large as a circus ring and slowly turning. The car with the ladle of metal is run on to a platform and raised by a hydraulic lift to the required hight and an attendant tips the ladle and controls the continuous flow of the metal until the ladle is emptied. Between the molds are covers which, before the ladle is reached, are automatically shifted to cover the spaces between the molds, and the attendant then has only to regulate the flow of metal so that the molds will be filled uniformly and each with a sufficient quantity. Each mold before it comes around again is turned over so that the pig, which by this time has set, is dumped upon one of a ring of traveling plates which go around with the molds. These plates as they travel along, however, descend into a tank of water, where the pig is cooled, and then they slowly rise again and at a certain point the plates tip outward and the pigs slide into a car. The entire operation is automatic and continuous. Everything about the "machine" is pure white, from the lime which, as a part of the operation, is continually applied to the molds. The pigs are not of the familiar shape, but are in section a triangle of about 10 inches base and, say, 4 inches high.

The train then passed the armor-plate department, but time limits would not permit a stop, and then backed into a building where the operation of oil tempering was witnessed. This would have made an impressive scene in a theater. The end of the building was dark and a narrow door perhaps 30 feet high swung slowly open, disclosing a brightly glowing interior. Then in the opening was seen suspended a red tube, say, 10 inches in diameter and 20 feet long, the chain and hook by which it was suspended being also of a glowing red. Immediately that the door was opened the tube and its suspending hook were seen to emerge and the door closed after them. The tube then traveled to the right until over the center of a large tank of oil, where it was quickly submerged, bright flames shooting up as it disappeared but being quickly extinguished. There were, of course, attendants directing operations, but they were not noticed, and it all seemed to be done by invisible agencies.

The train then entered another building and stopped in front of an open hearth furnace which was just tapped, and a large ladle was being rapidly filled by an immense stream of metal. As soon as the ladle was filled it was drawn a short distance, where it stood over an ingot mold and the metal was drawn from the bottom of the ladle to fill the mold. These molds passed in succession under the ladle for filling and then moving a little farther they come under the enormous hydraulic press, where each ingot while still fluid was subjected to a pressure of 7,000 tons. This fluid compression plant, as our readers know, is the only one in this country. We were not able to see the entire operation indicated above, as time would not permit.

The train then passed into the forge, where two hydraulic forging presses, one of 2,500 tons and the other of 5,000 tons, were each in active operation, one upon an engine shaft with solid cranks and a coupling flange on each end, and the other press working on a stern tube for a government ship. The ease and precision with which the piece was manipulated and the successive compressions effected showed most impressively the perfection of our modern facilities.

Leaving the forge building, the blacksmith shop was passed and the train entered one of the annealing plants. All forgings made at the works are subjected to the annealing process. They are carefully heated to predetermined temperatures and then cooled in the furnaces, thus relieving the metal of all forging and cooling strains.

The train then proceeded to machine shop No. 2, the largest machine shop in the world. As it was impossible to run the train through the building, the visitors entered on foot and looked at whatever operations they pleased. The work was, of course, mostly very large, and many of the operations were more or less unusual to the average shop, but it is not necessary here to speak of them. Special attention was called to the speed at which the machine tools were run in this shop, but it was hardly necessary to those familiar with the old gait. Not only the speeds were a wonder, but the standing up of the tool edges under the high temperatures produced. Work flooded with water would roll off chips of a most beautiful blue continuously without apparently wearing the tool. As our readers know, this latest wonder of the shop is to be credited to the Taylor-White tool steel which is used throughout the shop. Many visitors carried away souvenir chips. Few went the entire length of the shop, as here again the permitted time was used up.

From the machine shop the party then went to the fine dining room of the establishment, where, after removing the stains of the shop, an admirable luncheon was partaken of, and then the party was assembled again upon the observation train. Before leaving the works several photographs of the train were taken. A large number of ladies were participants in all the pleasures of the trip. The train was soon backed down to the Lehigh Valley train and all in a few minutes were comfortably seated and were swiftly whirled to New York. The Bethlehem Steel Company knows how to do something more than to produce and manipulate steel, and they could not have a more able executive in these finer details than Mr. H. F. J. Porter.

The Standardization of Extra Heavy Pipe Flanges.

Steam pressures varying from 100 to 250 pounds pressure entered into engineering practice about the year 1889. For pressures less than 100 pounds there had long existed confusion regarding standards for flanges of pipe, fittings and valves. A schedule of standard flanges was adopted July 18, 1894, by a committee of the Master Steam & Hot Water Fitters' Association, a committee of the American Society of Mechanical Engineers, and the representatives of the leading valve and fitting manufacturers of the United States. As the use of high steam pressures became more general there came into existence so many different diameters, thicknesses, drilling circles and numbers of bolts, that manufacturers could not safely keep stocks of goods, and mill architects and engineers were greatly delayed at times in making up specifications for contemplated work on account of the time taken to find out what the different manufacturers could or would furnish.

Recognizing the need of a standard for extra heavy, Mr. J. C. Meloon, mechanical superintendent of the General Fire Extinguisher Company, Providence, R. I., issued an invitation to the leading valve and fittings concerns of the country to meet and consider this subject. In response to this invitation several of the largest concerns sent representatives to a meeting at New York city, April 24, 1901. At that meeting a committee was chosen to formulate a standard. This committee consisted of J. C. Meloon, mechanical superintendent, General Fire Extinguisher Company, Providence, R. I.; J. F. O'Brien, secretary, The Pratt & Cady Company, Hartford, Conn.; L. R. Greene, engineer, Walworth Manufacturing Company, Boston, Mass.; H. D. Gordon, mechanical engineer, Jenkins Bros., New York, N. Y.; F. A. Strong, superintendent, Eaton, Cole & Burnham Company, Bridgeport, Conn.; F. A. Connet, engineer, Builders' Iron Foundry, Providence, R. I.

Mr. Meloon was made chairman, Mr. O'Brien, secretary. The committee had various sessions and submitted to the manufacturers interested the following recommendations and schedule for standards at a meeting held in New York city June 28, 1901:

1. Multiples of four for drilling.

2. Drilling should straddle the vertical axis.

3. Bolt centers not to exceed 3⅝ inches, except on 2½-inch size. Committee at first proposed 8⅝-inch bolts, but sample elbows and flanges were drilled and bolted together and it was found that 8⅝-inch bolts interfered with inserting the bolts.

4. Distance from center of bolt to edge of the flange should always equal or exceed the diameter of bolt plus ⅛ inch for 9-inch valves and under, and diameter of bolt plus not less than ¼ inch for sizes larger.

Size of Pipe.	Diameter of Flange.	Thickness of Flange.	Diam. of Bolt Circle.	Number of Bolts.	Size of Bolts.
Inches	Inches	Inches	Inches		Inches
2	6½	⅞	5	4	⅝
2½	7½	1	5⅞	4	¾
3	8¼	1⅛	6⅝	8	⅝
3½	9	1 3/16	7¼	8	⅝
4	10	1¼	7⅞	8	¾
4½	10½	1 5/16	8½	8	¾
5	11	1⅜	9¼	8	¾
6	12½	1 7/16	10⅝	12	¾
7	14	1½	11⅞	12	⅞
8	15	1⅝	13	12	⅞
9	16	1¾	14	12	⅞
10	17½	1⅞	15¼	16	⅞
12	20	2	17¾	16	⅞
14	22½	2⅛	20	20	⅞
15	23½	2 3/16	21	20	1
16	25	2¼	22½	20	1
18	27	2⅜	24½	24	1
20	29½	2½	26¾	24	1⅛
22	31½	2⅝	28¾	28	1⅛
24	34	2¾	31¼	28	1⅛

5. TABLE OF FLANGE DIMENSIONS, ETC., FOR EXTRA HEAVY PIPE FITTINGS.

The bolt circle diameters, as above stated, will allow the use of a calking recess on pipe flanges, provided such device is specified.

The schedule presented was unanimously adopted by the manufacturers present, and January 1, 1902, was the date set for the adoption of the same.

The following firms have agreed to adopt the standard and to put the same into effect January 1, 1902: The Eaton, Cole & Burnham Company, Bridgeport, Conn.; Chapman Valve Manufacturing Company, Indian Orchard, Mass.; Walworth Manufacturing Company, Boston, Mass.; Crane Company, Chicago, Ill.; The Pratt & Cady Company, Hartford, Conn.; Jenkins Bros., New York city; General Fire Extinguisher Company, Providence, R. I.; Builders' Iron Foundry, Providence, R. I.; Jarecki Manufacturing Company, Erie, Pa.; Crosby Steam Gage & Valve Company, Boston, Mass.; The Kennedy Valve Manufacturing Company, New York City; The Ludlow Valve Manufacturing Company, Troy, N. Y.; The Lunkenheimer Company, Cincinnati, Ohio; The Michigan Brass & Iron Works, Detroit, Mich.; The Kelly & Jones Company, New York City; Eastwood Wire Manufacturing Company, Belleville, N. J.; National Tube Company, Pittsburgh, Pa.; Coffin Valve Company, Boston, Mass.; Rensselaer Manufacturing Company, Troy, N. Y.; The Mason Regulator Company, Boston, Mass.; McNab & Harlin Manufacturing Company, New York city; The John Davis Company, Chicago, Ill.; Watson & McDaniel Company, Philadelphia, Pa.; Ross Valve Company, Troy, N. Y.; Edward P. Bates, Syracuse, N. Y.

The following firms will furnish to standard if desired by their customers: Best Manufacturing Company, Pittsburgh, Pa.; Pittsburgh Valve, Foundry & Construction Company, Pittsburgh, Pa.; Eddy Valve Company, Waterford, N. Y.

The committee's labors were very much lightened by the hearty co-operation of all the firms with whom they held communication, and the list of firms mentioned, embracing the largest manufacturers of valves and fittings in the East and West, shows the interest taken i the subject. A limited number of the schedules will be printed by the committee, and copies can be obtained of the secretary, J. F. O'Brien, P. O. Drawer 66, Station A, Hartford, Conn.

Inquiries for Machinery.

(160) Wanted, names and addresses of manufacturers of sewing machines that will crochet four figures on cloth.

(161) Names of manufacturers of machines for making wrought or pressed nails cut from strips of plate and shaped while red hot; two of the opposite sides of the nails to be parallel for the entire length and the others to be parallel to about the middle, then tapering on both sides to a wedge-shaped point.

Personal.

K. A. Juthe has recently resigned as general superintendent of the Steamobile Company to become secretary and manager of the Thompson Automobile Company, Providence, R. I.

R. O. Cumback, who was superintendent of the Elizabethport repair shops of the Central Railroad of New Jersey, has resigned, and Mr. Harrison, who had been foreman of the erecting shop, has been appointed to fill the vacancy.

Harvey A. Higgins, general manager of the Standard Tool Company, manufacturer of twist drills, reamers, etc., Cleveland and New York, has returned from a five months' trip throughout Europe, in the interests of his company, and states it has resulted in very successful business.

W. A. Leonard, for the last five years superintendent of the Fellows Gear Shaper Company, of Springfield, Vt., and for the twelve years preceding with the Jones & Lamson Company, of the same place, has taken charge of the shops of the Geometric Drill Company, of Westville, Conn., as superintendent.

Obituary.

Mr. Henry Prentiss, Jr., assistant treasurer of the Prentiss Tool & Supply Company, died suddenly on October 10, 1901, aged tweny-five years.

Death of an Old Engineer.

Wood Benson, penniless and friendless, died in the almshouse in this city a few days ago. On May 27, 1829, he made the first run on the "John Bull," which went from Schenectady to Albany. He also ran the "De Witt Clinton."

Technical Publication.

"Technisches Auskunftsbuch für das Jahr, 1901. Notizen, Tabellen, Regeln, Formeln, Gesetze, Verordnungen, Preise und Bezugsquellen auf dem Gebiete des Bau- und Ingenieurwesens in alphabetischer Anordnung." By Hubert Joly. With 142 figures. Eighth edition. Leipzig: K. F. Kohler.

This is an engineering and technical hand-book of unusually generous dimensions. It contains in fact 1,054 pages (4¾ x7⅛ inches), not counting advertisements, tables of logarithms or the pages reserved for diary and notes. The last mentioned are of cross-section paper divided into millimeters. The book obviously embraces a wealth of information which unfortunately is closed in its present form to the many who are not conversant with German. Doubtless those who wish to procure a copy will shortly be able to get the 1902 edition. We understand that the price is 8 marks, but are not definitely informed.

The author of this book has started a periodical called the "Technischer Anzeiger für die Industrie, das Bauwesen, die Technischen Behörden und Verwaltungen." It is printed at Wittenberg (Bez. Halle.) by the Verlag Joly Technischer Anzeiger. It is a semi-monthly digest of important current industrial and commercial news. It gives condensed lists of new patents, manufacturing enterprises, changes of personnel, market conditions, technical publications, etc., the machinery industries being accorded a fairly prominent place. This periodical is gotten up with much taste as to form.

The second quarterly number of "Power" has appeared and is devoted entirely to the illustration and description of what is to be seen in the way of power machinery at the Pan-American Exposition, Buffalo. Those interested in this class of machinery can scarcely afford to miss seeing it.

Commercial Review.

NEW YORK, Monday, Oct. 14.

MACHINE TOOLS AND OTHER MACHINERY.

Fresh inquiry of representative New York houses in the machine-tool line brings out replies indicating a continuation

of excellent trade conditions and in some instances an expansion of demand. The advancing tendency in prices recently reported in some quarters has not, however, proved epidemic.

One of the strongest evidences in favor of the prosperity of machinery trade conditions this year is the small number of failures as compared with last. For the third quarter of 1901 "Dun's Review" puts failures in the machinery and tool line at 28 with total liabilities of $1,216,044, against 57 with $2,679,812 liabilities for the corresponding period last year. This shows a decrease of more than 50 per cent. in the lines named, while in manufacturing industries as a whole the decrease was not much more than 10 per cent. The class covering "iron, foundries and nails" is another that shows a large decrease in the periods compared, the number of failures falling from 17 to 9 and the liabilities from $1,828,245 to $127,176.

October has opened up at the office of the Niles-Bement-Pond Company in a manner that promises an excellent month's trade. September was fair, but did not beat August, which was a good month. The present inquiry from the railroads is pronounced active to a degree unsurpassed at any time during the year. Roads from Boston to Denver are in the market. At the Pond works in Plainfield, N. J., an addition some 150 feet long is now being made to the machine shop, the side walls having already been completed, and work has commenced on a foundry addition.

The Garvin Machine Company lately received an order for ten of its universal milling machines of one size for shipment to Europe, and in two days they were boxed and on board the steamer. The company regards this as a pretty good illustration of the advantages of New York as a market. It may be noted that they have found orders and inquiry in the last week better than for several weeks previous.

The remains of the property of the Fifield Tool Company at Lowell, Mass., whose works were burned a few months ago, have been purchased at public sale by George W. Fifield for $18,000. It is Mr. Fifield's intention to rebuild the works at once and resume the manufacture of the lines to which they were formerly devoted.

The Erie Railroad has received estimates on quite a large quantity of iron and wood-working machinery. It is believed that this machinery will be installed in its shops at Susquehanna, Pa., and that the road intends to give increased importance to those shops in its work.

A curious circumstance occurred not long ago in the award of a government contract. A wood-working machine had been specified in a manner which obviously referred to one of a particular make. An agent for another make of machine which did not conform exactly to the specifications put in a bid based upon his. It proved that his estimate was higher than that made on behalf of the machine covered by the specifications—in fact higher than the figure named by any competitor—yet he has received word that his bid has passed such a state of official consideration that he is practically assured of receiving the contract.

Bids were opened, September 3, on a quantity of machine tools, etc., to be delivered at the Brooklyn Navy Yard and afterward, it is understood, shipped to Manila. It is causing a little surprise that the awards have not yet been made.

A few weeks ago we mentioned a $600,000 concern which was to be organized at Milwaukee, Wis., to enter the manufacture of mining machinery, the prime movers of which had been connected with the E. P. Allis Company. This company, which according to latest accounts is still without a name, is going ahead with its plans and has decided to locate at Cudahy, near Milwaukee. It is about on the point of establishing temporary quarters and putting 300 men to work on pattern making. The new plant at Cudahy is expected to be ready by the first of next June, to employ 500 men, and to be equal in character of equipment to any in the country. The last statement of its intended product we have seen is "engines and all kinds of machinery." The man who seems to be most prominently connected with the enterprise is Benjamin T. Leuzarder, who formerly was connected with the E. P. Allis Company and previous to embarking on the present enterprise has been president of the Shaw Steel Casting Company.

A heavy shadow is cast in the local machine-tool business circle by the sudden death of Henry Prentiss, Jr., of the Prentiss Tool & Supply Company. Mr. Prentiss was a young man endowed with such qualities as make his loss an especially hard one, and it is no perfunctory sympathy that is felt for his father, the head of the company.

CHICAGO MACHINERY MARKET.

The Western electric machinery trade is about as good as it has ever been. That is the common report. Despite largely increased facilities for production, every manufacturer of electrical machinery seems to have all the orders he can fill and many plants are running far into the night in an endeavor to keep even with orders. Little is said about it, but not a few of the makers are considerably behind in their orders. Promising shipment in three or four months, twice that period is said to elapse sometimes before delivery is made. There is said to have been one generator bought here for shipment last November which has not yet arrived at destination. That is of course an extreme case, but for periods of one, two or even three months the number of delinquent equipments are numerous.

The activity is pronounced in all branches of the electrical trade. There is good buying by municipalities and by private lighting plants, and for power purposes manufacturers are equally good customers of the electrical machinery builders. One of the larger purchases recently made at Chicago was an equipment consisting of a 400-kilowatt generator and motors aggregating about 500 horse-power by the National Hide and Leather Company for a new plant to be erected at Chicago. The Western Electric Company obtained the order.

The Milwaukee Electric Company reports business excellent. The company has just sold 125 motors ranging from 1 to 50 horse-power each to the Nordberg Manufacturing Company, makers of Corliss engines.

The Gregory Electric Company, dealers in second-hand electrical machinery, say trade is the best ever known.

The Eddy Electric Manufacturing Company says inquiry has improved within the past few days, many prospective buyers who hesitated a month ago now being active buyers. These buyers usually want deliveries that are impossible. The Eddy plant is running regularly until 11 o'clock at night.

The Armstrong Bros. Tool Company has received an order from Charles Churchill & Co., of London, their agents, for sixty-six of their gang planer tools These are meeting with a readly sale wherever introduced.

Quotations.

NEW YORK, Monday, Oct. 14.

Pennsylvania Foundry Pig Irons, Jersey City delivery:

No. 1 X	$15 15 @ $15 65
No. 2 X	14 65 @ 15 15
No. 2 plain	14 15 @ 14 65
Gray forge	13 50 @ 14 00

Alabama Pig, New York delivery:

No. 1 foundry, or soft	15 50 @ 15 75
No. 2 foundry, or soft	14 75 @ 15 00
No. 3 foundry	14 25 @ 14 50
Foundry forge, or No. 4	13 75 @ 14 00

Bar Iron—Base sizes—Refined brands, mill price on dock, 1.68c. in carload lots; from store, 1.90 @ 1.95c. in small lots.

Tool Steel—Base sizes—Good standard quality, 7c.; extra grades, 10c. and upward.

Machinery Steel—Base sizes—1.90 @ 2.00c. from store.

Cold Rolled Steel Shafting—Base sizes—From store, 2¼ @ 2½c.

Copper—Lake Superior ingot, spot, 16¾ @ 17c.; electrolytic, 16½ @ 16⅝c.; casting, 16 @ 16¼c.

Pig Tin—In 5- and 10-ton lots f. o. b., New York, 25⅛c.

Pig Lead—For wholesale lots, 4⅜c., with .02½ @ .05c. extra for carloads.

Spelter—4.25 @ 4.30c., New York delivery.

Antimony—Cookson's, 10¼ @ 10⅜c.; U. S., 8¼ @ 8¾c.; Hungarian and Japanese, 8¼ @ 8⅜c.

The Works and Some of the Product of Alfred Herbert, Ltd., of Coventry, England—I.

Our readers are of course more or less familiar with the name of Alfred Herbert, of Coventry, England. Coventry is a very old manufacturing town and its latest activity has been devoted to the production of bicycles, for which it is the leading center of manufacture. The establishment of Alfred Herbert, Ltd., was for a time devoted almost entirely to the production of tools adapted specially to bicycle work. This has naturally developed into other lines, and the list of tools now made includes automatic and semi-automatic turret machinery of practically every size, milling machines, sensitive drilling machines, cutter grinders, etc. These machines are built to standard designs in considerable quantities, and every advantage is taken of the use of jigs, gages and special appliances to reduce the cost of production and secure good, interchangeable work.

Fig. 1 is a plan of the works. It will be noticed that they are all one story high, with the exception of the small-tool department and the drawing offices. Fronting the main street, called Queen's Road, is a handsome three-story building, the ground floor of which is used as a warehouse. The first and second floors form the small-tool department, and this building is served by an elevator. At the corner of the street are the offices. It will be noticed that the machine and erecting shops form really one large shop, the only division being by means of a yard in the center and a messroom and smiths' shop. This yard will eventually be covered over.

The whole of the works are provided with a very complete system of light railway track, the trucks having roller bearings and being arranged to swivel, so that two short trucks can be used under a long bed, acting as bogy trucks and enabling sharp corners to be turned.

The main works employ about 560 men, and the foundry, which is situated at Foleshill, about two miles away, employs about 130 men.

Fig. 2 is a view in the small-tool department. In addition to small tools, gears are cut and tested in this department. It will be noted that the gear-cutting equipment is very complete, and includes spur-gear cutting machines by the Brown & Sharpe Manufacturing Company and the Fellows Gear Shaper Company, bevel wheel cutting machines of the Bilgram type, manufactured by J. E. Reinecker, of Chemnitz, and also a Gleason automatic bevel-wheel cutting machine. In addition to these there can be seen at the back a special rack-cutting machine by Gould & Eberhardt, and in the foreground an automatic worm-wheel cutting machine by the Grant Machine Tool Company. At the extreme left-hand is a gear-testing machine by means of which gears are tested

FIG. 1. PLAN OF WORKS OF ALFRED HERBERT, LTD., COVENTRY, ENGLAND.

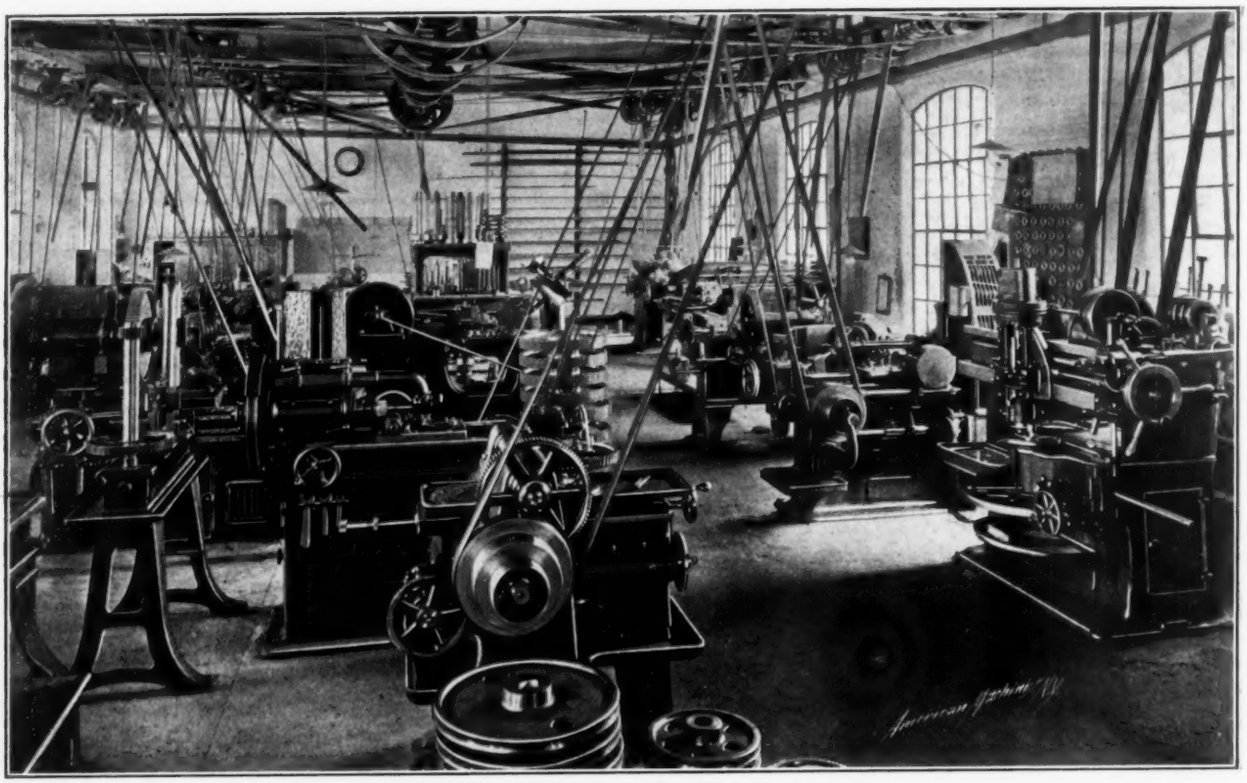


FIG. 2. VIEW IN SMALL-TOOL SHOP.

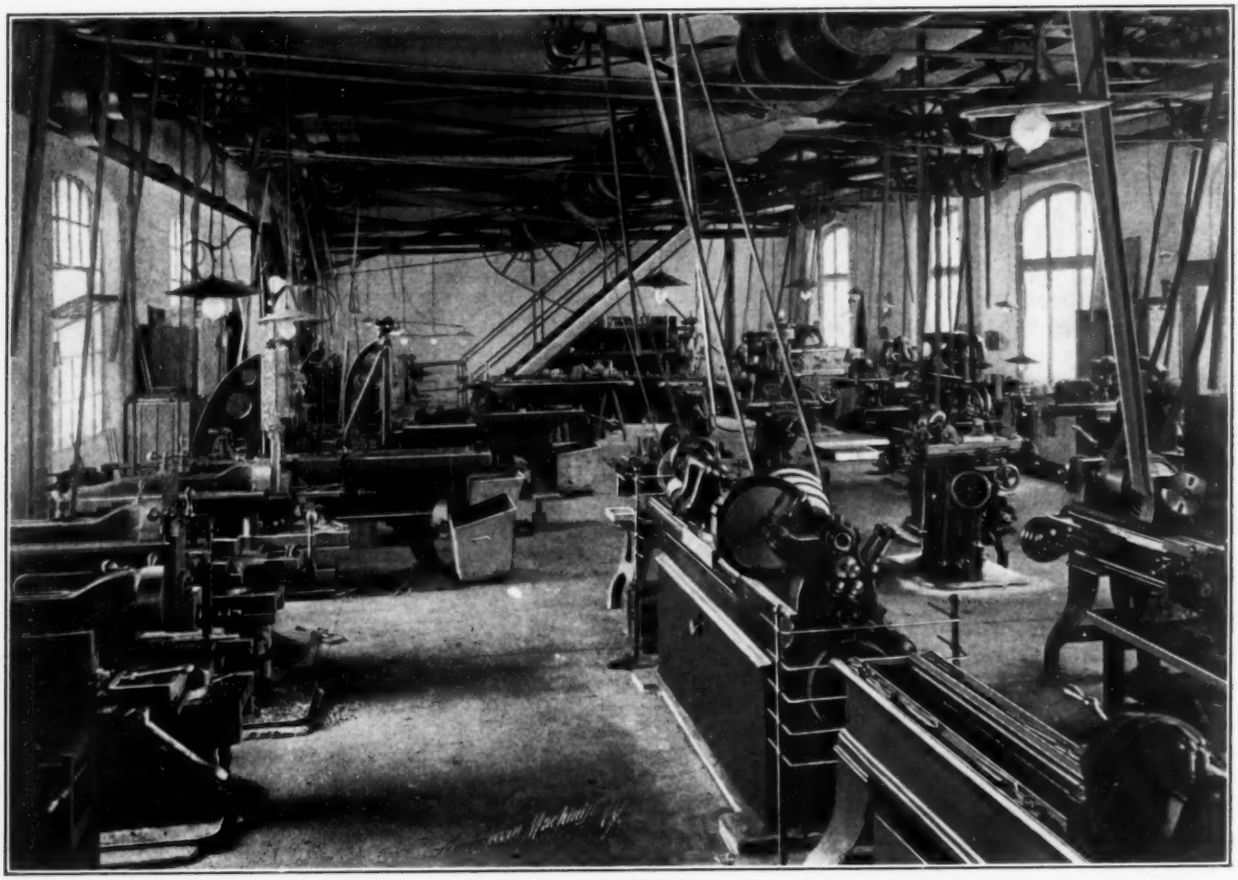


FIG. 3. VIEW IN SMALL-TOOL DEPARTMENT.

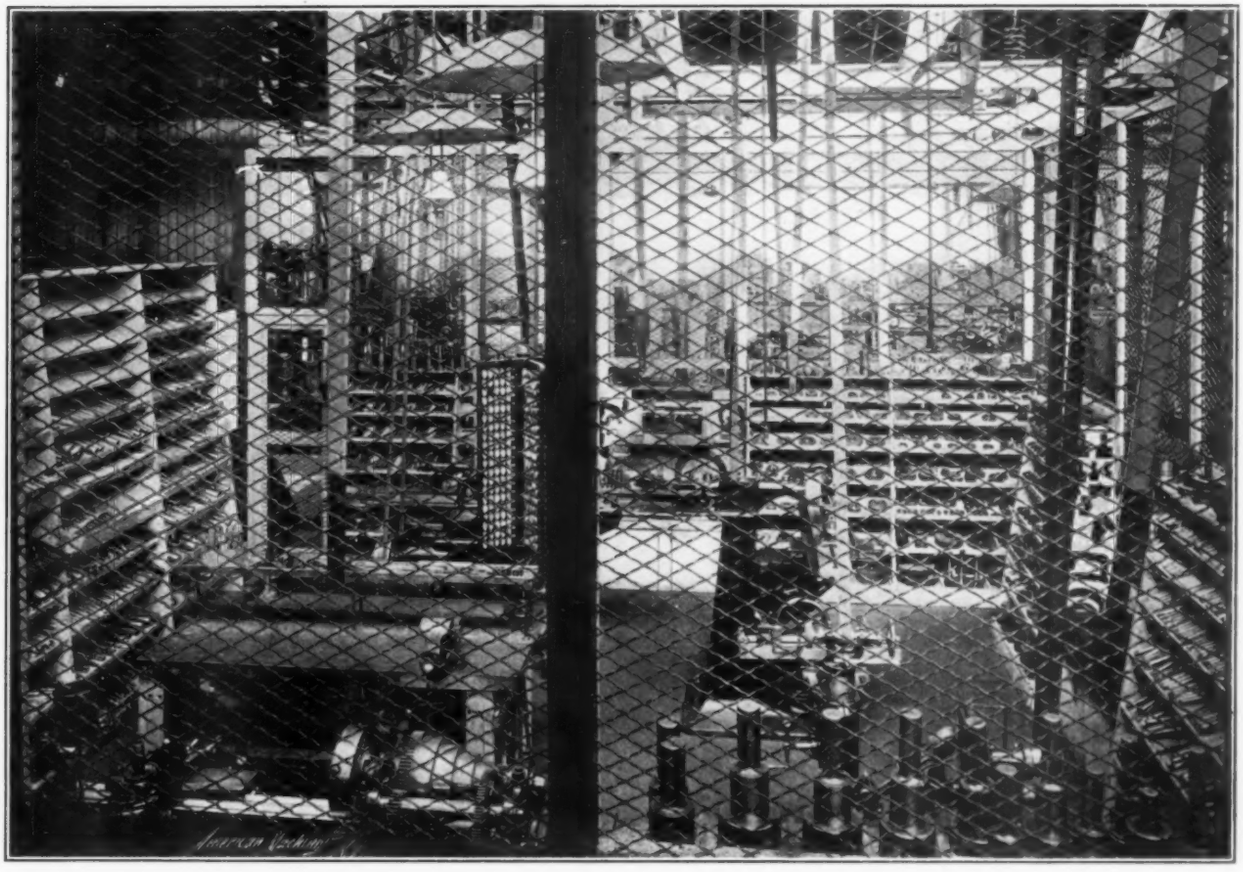


FIG. 4. TOOLROOM.

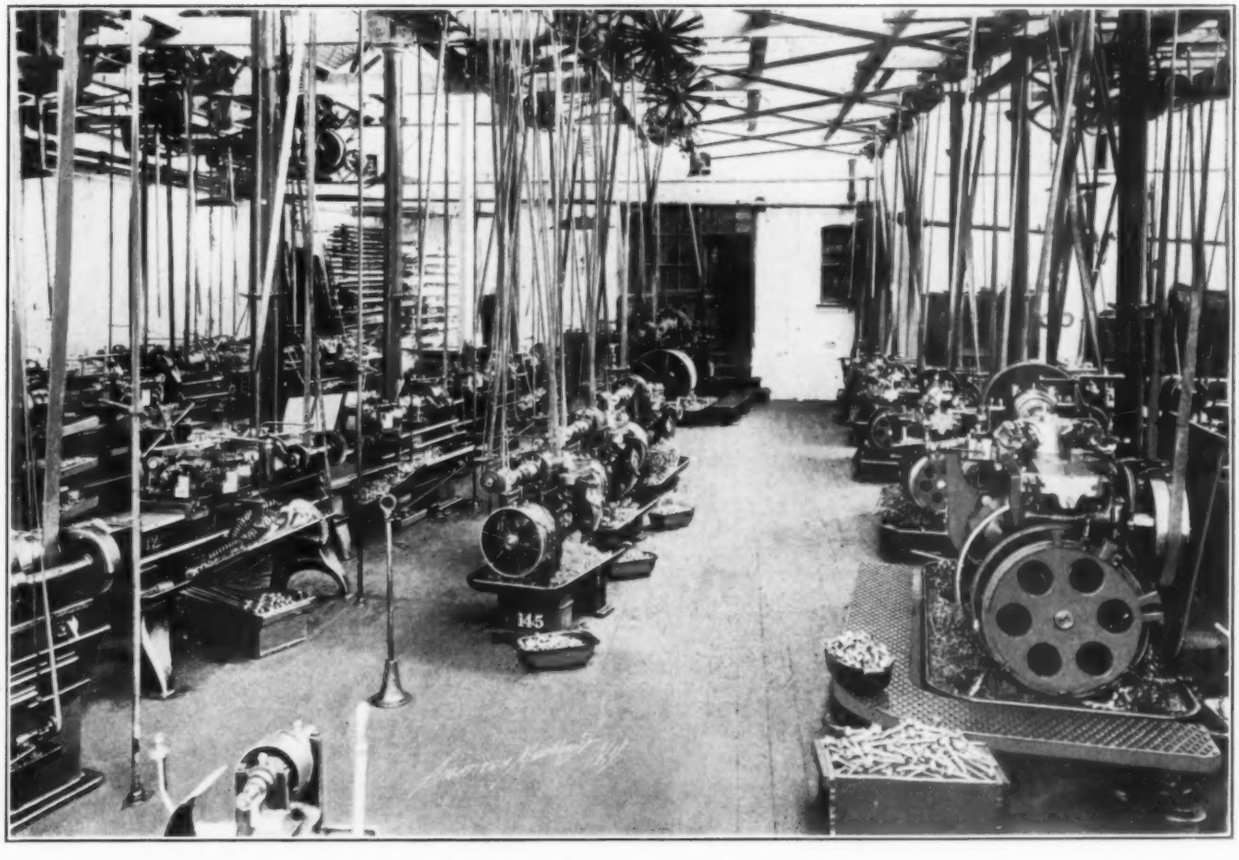


FIG. 5. AUTOMATIC TURRET LATHE DEPARTMENT.

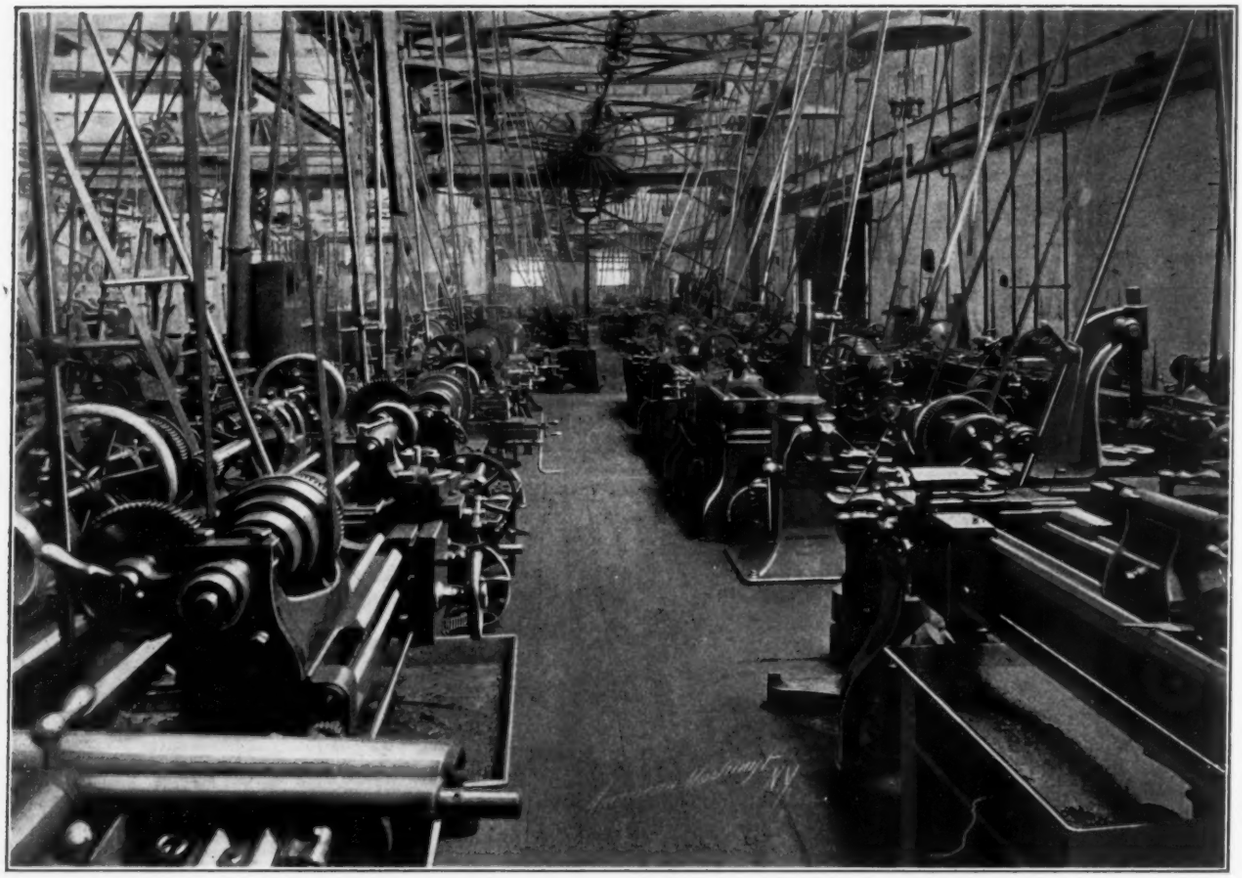


FIG. 6. VIEW IN LATHE DEPARTMENT.

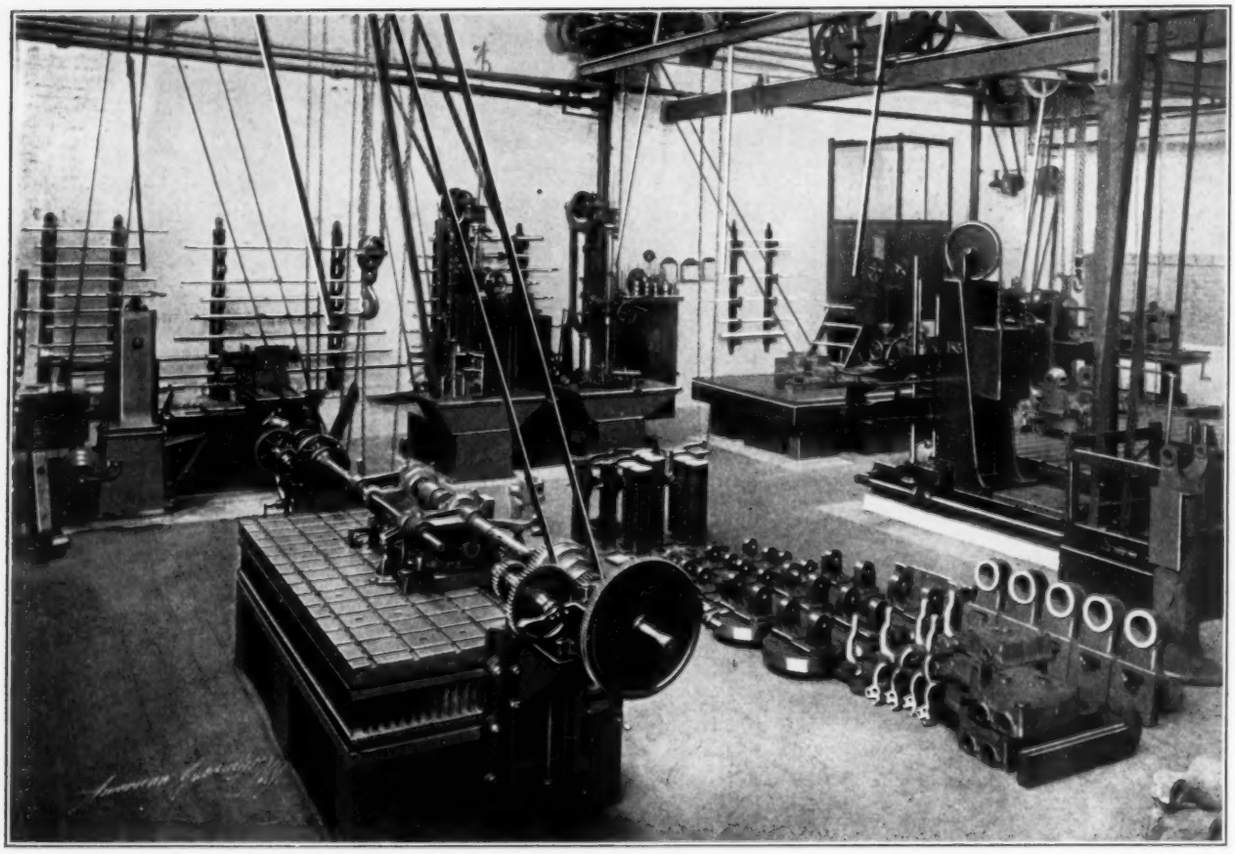


FIG. 7. BORING DEPARTMENT.

by running in mesh with standard pinions. This machine has an accurate screw for adjusting the distance between the centers, so that a gear can be tested under working conditions, and may be known to be right before it goes to the erecting floor or to the stores.

In this department there are also various types of milling machines, planers, shapers and lathes. The equipment includes a special backing-off lathe for machine-relieved cutters, hobs, etc. The work of hardening and tempering steel as carried on in this department is somewhat interesting. The equipment consists of gas furnaces and lead baths heated by gas. There is also a gas tempering oven and an arrangement for local hardening by means of a spray. In making special tools or chucks or any part in which hardening is required, the aim is not to harden any parts except those which are actually required by the conditions of the design to be hard.

Fig. 3 is another view in this department. The backing-off lathe (by Reinecker) is shown in the center of this view. In this department are made not only tools for the works, but for customers as well, a very large trade in small tools being done.

Fig. 4 shows one of the small toolrooms attached to the machine shops. In this department all tools, cutters, reamers and gages are stored and kept in order. No tools are made here, however. The check system is used, and the checks can be seen upon a rotating board in the center of the toolroom. This photograph was taken from outside, as it was impossible to get the camera in a sufficiently good position —hence the curious effect caused by the wire work.

Fig. 5 is a view of the automatic and turret lathe department. All the machines shown in this photograph are manufactured by the firm, and are good examples of their specialties. It will be noticed that there are two rows of automatics, nine machines in all, ranging up to two large machines taking 2½-inch bars. These machines produce all the screws, bolts, etc., used in the works. At the left-hand side of the view are a range of hexagon turret lathes, made by this firm and which have a very large sale in Great Britain.

Fig. 6 is a view of the lathe department. There is nothing special to be said about this, except that it gives a good idea of the size of this shop and the number of machines contained in it.

Fig. 7 shows various types of boring machines. The machine in the foreground is a special one for boring lathe headstocks, one of which can be seen in the jig. The spindle bearings and the hole for the back gear shaft are bored simultaneously, and in relation to each other as determined by the fixture.

Fig. 8 is another view of the turning department. This photograph also gives a good idea of the size of the shop. The practice here is to employ standard American lathes for all the regular lathe work. Much of the work, however, usually done on engine lathes is here performed on turret lathes.

(Continued next week.)

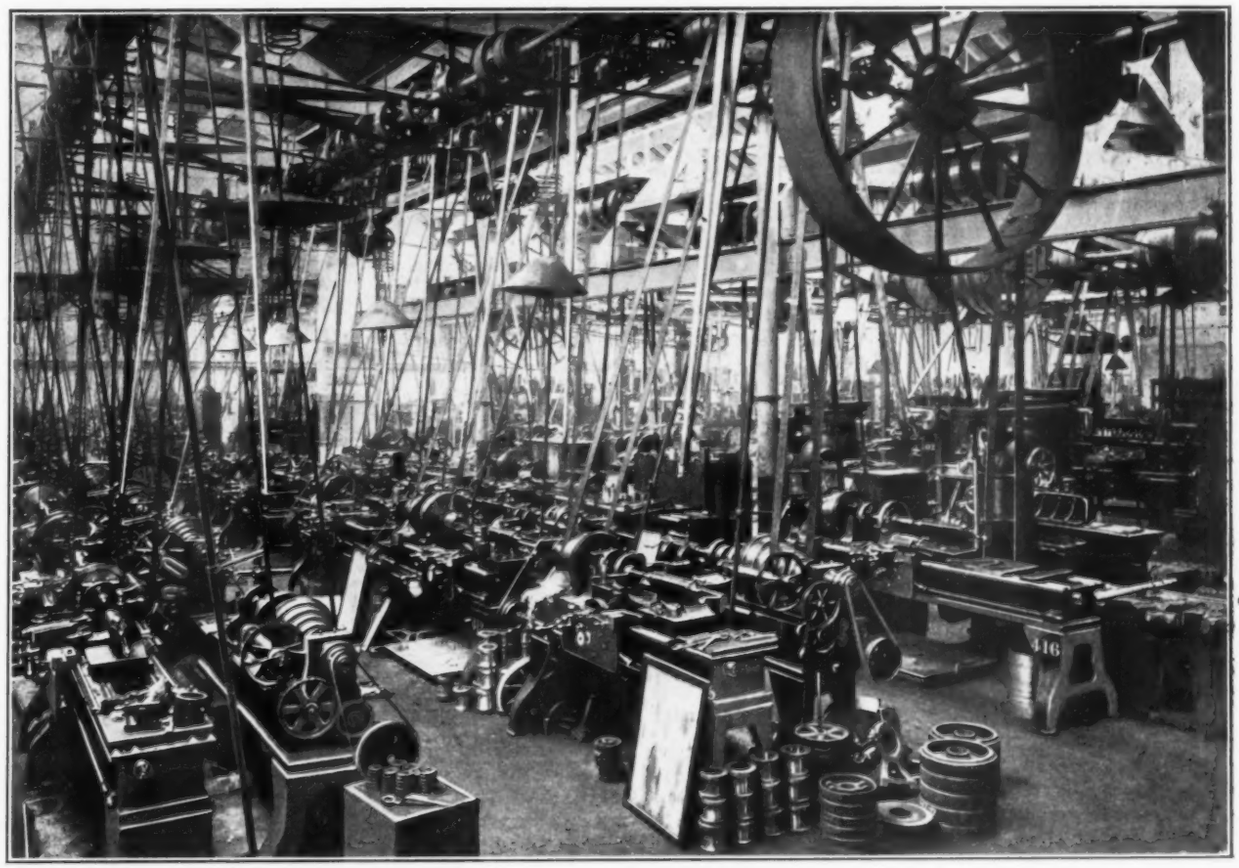


FIG. 8. VIEW IN TURNING DEPARTMENT.

A Foundry Trap.

Hot Springs, in the State of Arkansas, is far-famed for the curative power of its springs. It is also the possessor of a foundry whose reputation is not so extensive. What distinction it enjoys is not for any remarkable castings turned out therein, but on account of being a type of the backwoods foundry of which there are but few. A foundryman who recently went there to unload a case of rheumati m writes us that this shop has shut down for the present, the reason of its withdrawal from the market being that one of the wooden posts supporting the cupola caught fire from a run-out in the bottom of the cupola and burned off, when the aforesaid cupola tipped over on top of an upright boiler and caused the latter to burst. The incident passed off without injury to anyone.—"The Foundry."

Cutting Square Threaded Screws.

BY A. L. DE LEEUW.

Every machinist who ever had to cut a large screw with square threads knows that the job is like a good many other jobs—that is, it is not quite so easy as it looks. I am afraid, though, that most machinists would lose a part of their temper, if you told them when the job is finished that their square-threaded screw has no square threads. And yet many a man has found that his screw would not fit the nut, notwithstanding the care he took to get a perfect job. It is all right, of course, if one man cuts the screw and another man chases the nut, for then each can blame the other. But when one man does both, then there is a puzzle. This matter was brought to my attention when I had occasion to have a short screw turned up, about 3 inches in diameter and about 12 inches long, to fit in a nut about 4 inches long. The job is pretty easy so far, but there were 12 threads on the screw and the lead was 6 inches. One man did the whole job. He was a very experienced man, taking, as he thought, all necessary precautions, and still the screw refused to fit the nut. It fact, it would not even enter. The screw was, of course, too short to blame the poor lead screw for it. After I had studied the matter over, and found where the hitch was no one believed me, and least of all the man who did the job. It took me quite a while before demonstration convinced him, and this led me to believe that it may be a good thing to tell the readers of the "American Machinist" how it is possible to cut a square-threaded screw with anything but square threads, even though the greatest care and the best tools may be used.

Fig. 1 shows a screw of 8 inches diameter, 12 inches lead and triple thread. A glance at the figure will show at once that it is utterly impossible to use an ordinary square-nosed tool. Such a tool can only be used if the angle which the threads of the screw make with the axis is larger than the clearance angle of the tool. It is, of course, understood that it is not quite right to speak of the angle which the thread makes with the axis, because this angle becomes smaller the deeper you go in toward the core of the screw. I am referring here to the smallest angle. One can easily see that this angle is a variable quantity, if one speaks of the *steepness* of the *thread* instead of the *angle* which the thread makes with the axis. Just imagine you cut out a right-angle triangle which you can wind just once around a cylinder. The hypothenuse of this triangle marks a screw thread on the cylinder. (See Fig. 2.) AB is of course equal to the circumference of a section of the cylinder. BC is the pitch of the screw, and angle BAC is the steepness of the thread. Now cut out another triangle which will go once around a larger cylinder, but with the same pitch—that is, $EF = BC$, but $DE > AB$. This triangle will also mark a screw thread on the big cylinder. One sees here at a glance that the steepness of the first screw thread is greater than the steepness of the second one, though the pitches of the two screws are the same. This is what happens when you go from the outside of the screw toward the core. The pitch always remains the same, but the diameter of the cylinder, upon which the screw is cut, becomes smaller, and therefore the steepness of the thread increases.

The square-nose tool should be of such a shape that its sides will clear the steepest portion of the thread; otherwise you cannot make it enter.

A tool is shown in dotted lines in Fig. 1, which will enter the screw thread as shown there. It clears at all points. But the shape of the tool is a very unhappy one. The left side is entirely too thin, and would not hold its edge, and the right side has no cutting edge, and therefore will not cut.

Another tool is shown further to the left, which might be called a combination tool, for it is really two tools forged into one. It will enter the thread; both sides have clearance and top rake, and there is perhaps metal enough to make the tool last a little while—at least in this case, because the pitch is so heavy. What this tool will do when it begins to cut at the bottom of the thread, I am not prepared to say. Fact is, I never used one like this, and I don't believe anybody else ever did. I simply show it, in order to illustrate why the first tool won't work. It may be the proper place here to make a side remark. It may seem to some of the readers as if this tool had no clearance at the right-hand side, because this right-hand side stands off to the right of the vertical line GH. The rotary motion of the screw, combined with the traversing motion of the tool, however, provides the necessary clearance. All that is necessary to see this clearly is to imagine that you take the tool in your hand in the position as shown here, and travel around the blank in a screw line, while the blank itself is standing still. This is really what would seem to happen to a fly seated on the blank, and who would perhaps think that the whole shop is turning around the blank, just as we have been thinking for centuries that the whole world was turning around the earth once in twenty-four hours.

Let us analyze the second tool a little further. It is possible to make the clearance angle at the left-hand side as small as you think best for proper cutting. I marked it in the illustration 5 degrees, though of course this should vary with the material to be cut. On the right-hand side, however, this angle, which is marked a, may be entirely too large for good practice. This angle, as seen in the illustration, depends on the difference in steepness between the outside and the root of the thread, and may be quite considerable when the thread is deep, as compared to the diameter of the screw.

$IKLM$ shows a third tool, which may be used, and very often is used, to cut square threaded screws. This tool is an ordinary square-nose tool with cutting edges both in front and on the sides, but which is not held horizontally. The center of the front cutting edge is at the hight of the center of the lathe, and its front cutting edge stands at right angles to the thread of the screw; sometimes at right angles to the thread at the outside of the screw, but more often at right angles to the thread half-way between the outside and the core. This last way is the way it is shown in the drawing. This tool has many bad qualities. It has too much clearance at the right-hand side. It has negative top rake at the same side, and, worst of all, it will not cut a square thread. The cross-sectioned part of the drawing shows what kind of thread this kind of tool will make. The left-hand side of the thread is undercut, the right-hand side is concave, and the bottom is hollowed out. The drawing is made to scale and is fairly accurate. The errors in the shape of the thread are not exaggerated, and the thread is what you would really get if you attempted to cut a screw 8 inches diameter, 12-inch lead, triple thread, with a tool, as shown here. Of course a screw like this is somewhat unusual, and the errors are somewhat larger than you would get in ordinary cases, but this is only a matter of quantity.

I will first try to explain why the bottom of the thread is hollowed out. Fig. 4 is an end view of the screw and the tool. AB is the front cutting edge of the tool. AC is the left-hand side cutting edge, and BD is the right-hand side cutting edge. When the center E of the front cutting edge has gone as deep as it should go, the points A and B are still some little distance away from where they should be. These points E, A and B are marked again in Fig. 1. The curve connecting these points is not a circle, it is hyperbola; but this does not matter here. If anyone still doubts whether the bottom of the thread is a curved line, let him hold a straight-edge at a slight angle against a shaft; let him imagine that this straight-edge is the front cutting edge of his tool, and he will see it at once.

It is a little bit more difficult to show why the sides of the thread also are curved. In Fig. 4 a few points of the side-cutting edge AC are marked with the figures 1, 2, 3, etc. I draw a radius to each of these points in Fig. 4. At the place where the screw is being cut the line 1, 2, 3, etc., will be a straight line, because the cutting edge of the tool fits against it. If I should place a straight-edge against the thread and in the direction of the radius which is drawn to the point 1, this straight-edge would not fit against the thread. The tool moves at right angles to the axis of the screw while

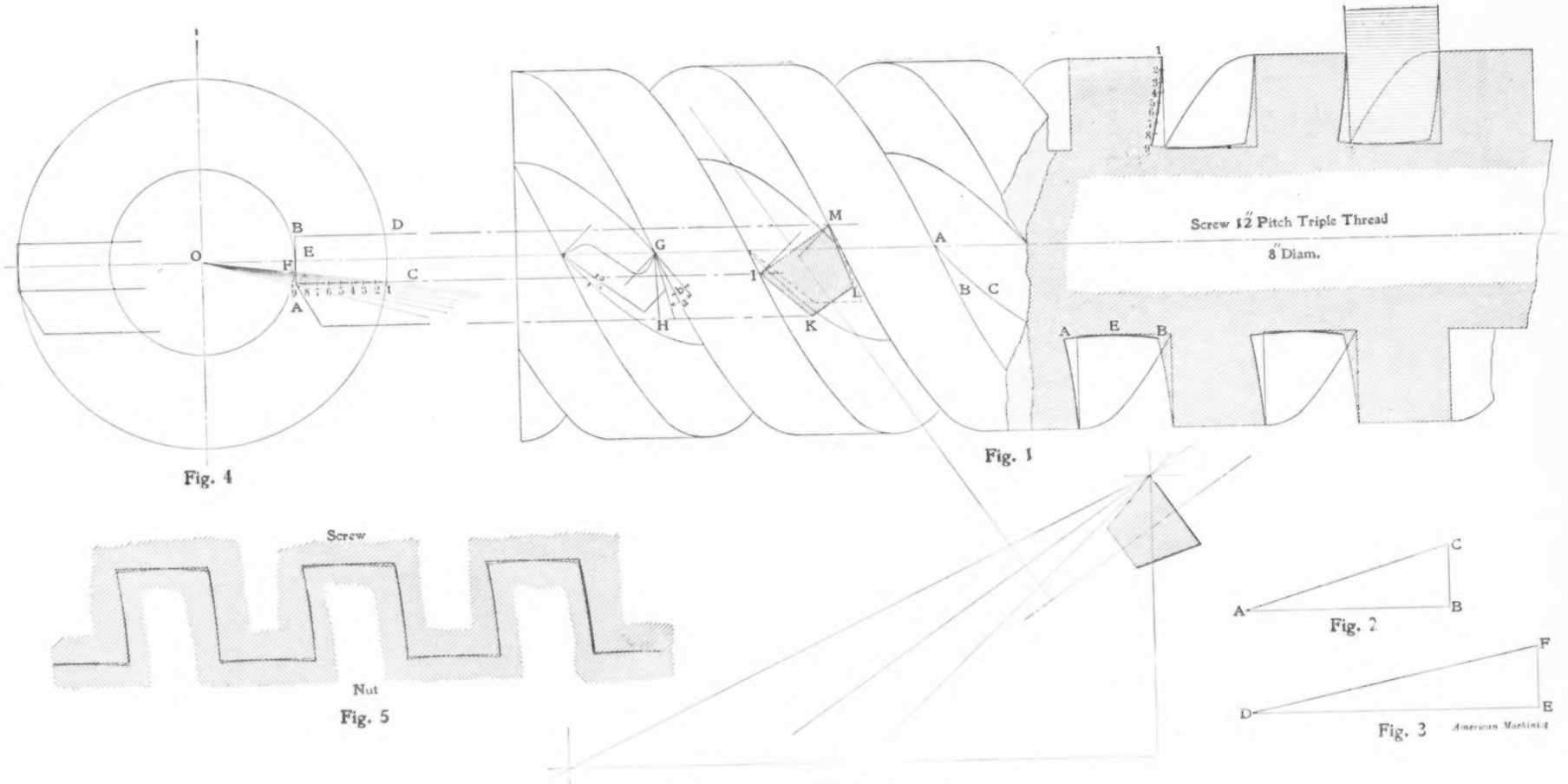


Fig. 4 Fig. 1 Fig. 5

Fig. 2 Fig. 3

A SQUARE THREAD, ITS TOOL AND ITS NUT.

being fed from 1 to 9. The line 1*F* should be at right angles to the axis of the screw; but, as I said, the line 1 to 9 is in that direction and if you travel from point 9 to point *F* you not only travel around the screw, but also lengthwise. Therefore, the point *F* stands off somewhat to one side. For instance, if the lead of the screw is 12 inches and the angle *A O F* is 10 degrees (or 1-36 of the whole circumference), then point *F* will stand off to one side (in relation to point *A*) an amount equal to 1-36 of 12" = ⅓ of an inch. The angle *A O F* varies when the radius is drawn respectively to the points 1, 2, 3, etc., but this variation cannot be expressed by a simple proportion, and this is the reason why the points 1, 2, 3, etc., on the thread (see Fig. 1) are not situated on a straight line but on a curve. It will now be understood why the threads of the screw look as shown in Fig. 1. The top of the thread is straight, the bottom is hollow, and the sides are curved. The same reasoning as followed above will show that the threads of a chased nut have a similar shape. In Fig. 5 nut and screw are drawn together, and, as will be seen, there is interference both at the bottom of the screw threads and on the sides. That there is some clearance at the top of the screw thread will not help you much.

It would be possible to form a tool with such a shape of cutting edges that the result would be a real square-threaded screw. And this perfect tool could be made mechanically—that is, could be generated on an ordinary lathe. This tool, however, would have curved sides; one side concave and the other convex. Though this tool would exactly fit in a screw with square threads, it would not be possible to insert it. If you have any doubts, just look at Fig. 1, where such a shaped tool is shown in the horizontal cross section lines. It would not be possible to feed this tool in.

The only way that I know of making large square-threaded screws with heavy pitch is to first do the roughing with any kind of tool that appeals to your fancy and then to work out the sides and bottom

separately, with some tool with only one cutting edge, taking care to always have the cutting edge on the center. This method may seem somewhat slow, but it is really a fast one, considering the amount of saving in fitting, scraping and profanity.

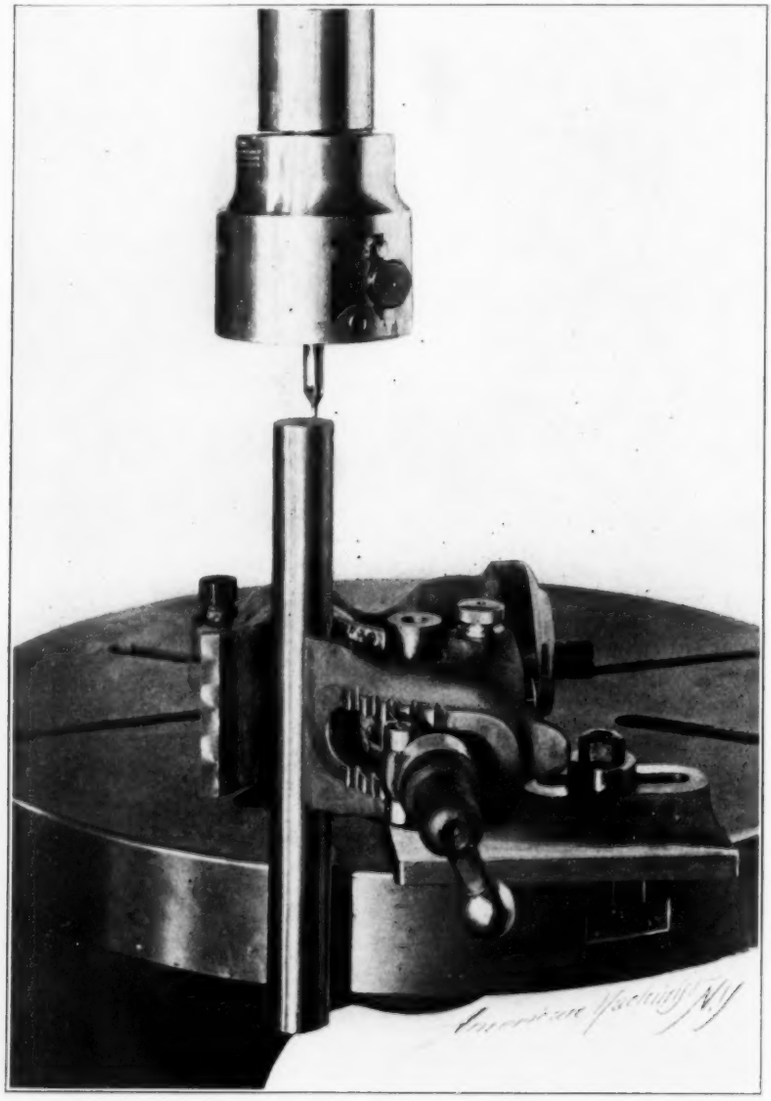
It need hardly be said that the foregoing also applies to the cutting of screws with bastard threads and to worms. The effect on a bastard screw, however, is not so easily noticed, as most large bastard screws are used with half nuts. Of course, the bearing in the half nut will not be a perfect one, but the interference is not so great as to prevent the half nut from closing on the screw, and therefore the evil is not found out, though it exists just the same.

The effect on worms is still less easily perceived, because it is most likely that the hob for cutting the worm wheel is cut in the same manner as the worm, and as the hob generates the worm wheel it follows that anything having the same shape as the hob will fit the worm wheel and work with it. The error shows itself very plainly, however, if hob and worm are cut by different methods.

Hamilton, Ohio.

The Bath Universal Work Holder.

At page 898 we illustrated and described the Bath universal cutter and tool grinder, and, as an incidental feature of it, showed the universal holder which we here show as an independent device designed for holding almost any kind of work on any kind of a machine in any position. The holder is supplied independently of the grinder, and the illustrations show its application to drill press work. It will be recalled that this device consists of a "V" which can be placed in any required position by means of two graduated circles which are in planes perpendicular to each other, and the engravings indicate at a glance the variety of positions in which this "V" or an attached vise (which is also a part of the fixture) can be placed. The clamp holds the work securely in any position, and when set for a given piece, holds all similar pieces in the same position. It is made by the American Watch Tool Company, Waltham, Mass.



THE BATH UNIVERSAL WORK HOLDER.

Newfoundland and its Industries.

GENERAL CHARACTERISTICS.

It is a common experience for people to make friends with residents on the other side of town while they have not even a bowing acquaintance with their next door neighbors. There is a good deal of the same tendency in the foreign trade relations of American machinery manufacturers. They hobnob with natives in every corner of Europe, Asia, Africa and Oceanica, while they leave the American Continent to the Germans or to stagnation from lack of outside enterprise. Not only is disproportionately small pains taken to study the commercial needs of Spanish America, but the English-speaking nation third in importance in this hemisphere is almost utterly ignored. We have learned all about the industrial conditions of Roumania, Siam and Siberia; it is time we heard something about those of Newfoundland.

To judge of the industrial prospects of the island a survey of its general aspects is of prime importance. Newfoundland is unfairly characterized in the average mind by a certain submarine plateau reaching some hundred miles off its shores and known as "The Banks," where the Arctic current conflicts with the Gulf Stream and fogs perennially ensue. As a matter of fact, the interior and west coast are as clear as a bell, while the atmosphere of even the eastern shore, where sea fogs occasionally pitch their tents, presents a pleasing contrast to that of New York city. On the voyage to Newfoundland thick weather is common between New York and Halifax, while from Halifax to St. Johns clear air prevails. I never saw such a brilliant star display as on the approach to St. Johns. It may be somewhat a surprise to learn also that the temperature in this part of the island rarely falls much below zero Fahr. in the winter, while it seldom rises above 80 degrees in the summer. The winters, however, are of long duration. On the west coast the extremes of temperature are greater.

The island of Newfoundland is almost an unbroken, and in parts unexplored, wilderness with a few flea bites of civilization on the sea coast. The eastern shore is exceedingly rugged, with numerous bays branching out into fjords which bring it into comparison with the coast of Norway. The appearance of the Hudson through the Highlands gives an idea of what some of the scenery is like. The peninsula on which St. Johns is situated is for the most part exceedingly stony, but with some productive agricultural land. There

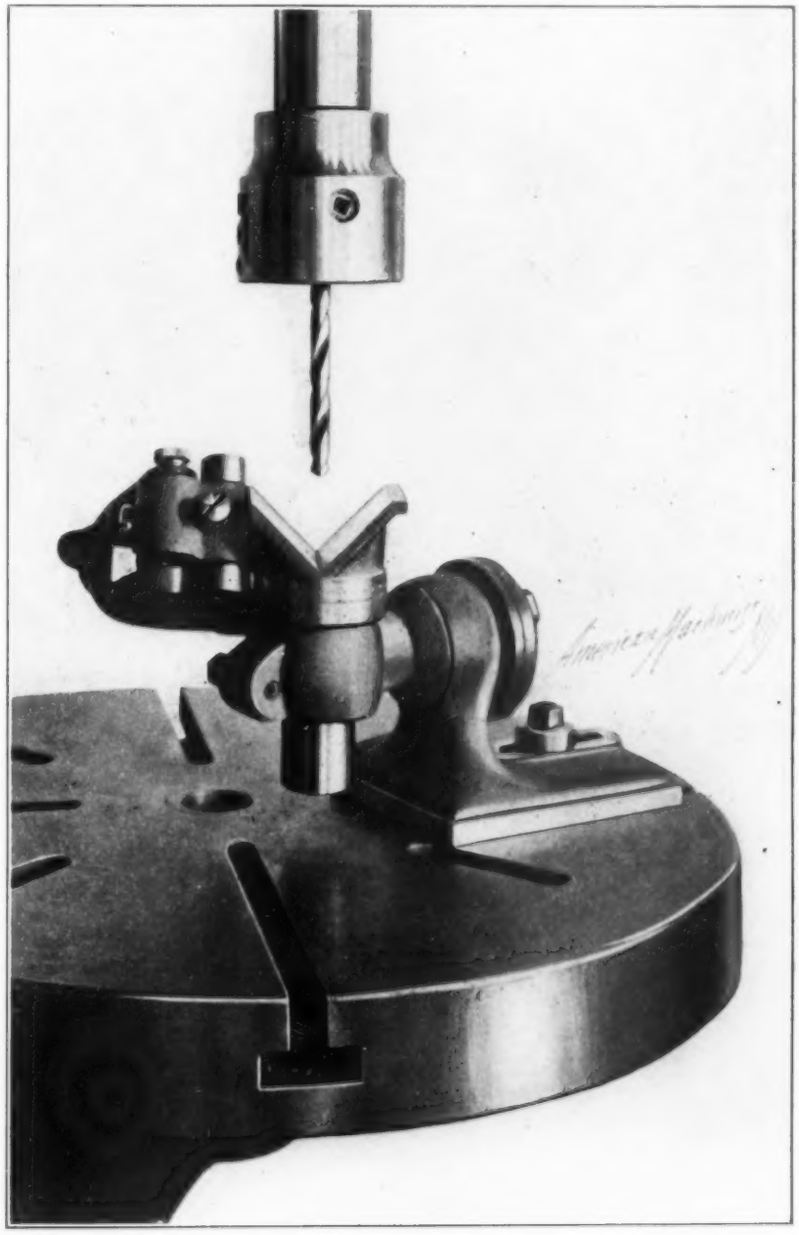
is a fair amount of arable soil on the island, but much more that is worthless for this purpose. Forests of fir trees alternate with expanses of bog lands, the peaty soil of which may perhaps be exploited for fuel ages hence. These bog lands or caribou pastures are evidently the beds of lakes left from the Glacial Age and which in subsiding have subdivided into countless minor ones ranging from noble lakes sixty or seventy miles long down to the smallest ponds. The western coast of the island is not unlike an ordinary mountainous region of the States. Its vegetation is more luxuriant than that in the vicinity of St. Johns. Its scenery is extremely fine, yet without excessive magnitude of feature. Newfoundland is a region whose beauty awaits unveiling and whose industrial development will go hand in hand with its adoption as a fashionable resort. At present it is visited by transient tourists, but in traveling through the island I did not meet with a single summer hotel. One cannot but think with regret of the time these innovations shall appear, for it will result in the sophistication of one of the few remaining groups of English-speaking people who still retain the simplicity and trustfulness of old-fashioned country life.

And now to come in detail to the industries of Newfoundland that have a mechanical bearing, I may premise that these are important rather for their potentialities than their present magnitude. Such as they are I do not pretend to treat them exhaustively, but to record a few impressions obtained while passing through the island and subject to such license in grasping and remembering facts as may be allowed on a vacation trip.

FISHERY PLANTS.

First in prominence among occupations of Newfoundlanders must of course be reckoned those of the sea. Up to the early part of the present century the policy of the British Government was to use the island simply as a fishing station for a migratory summer population, and to this end rigorous laws against its agricultural development were enforced. The cod fisheries to-day amount to $4,500,000 in average annual value, the lobster fishery to $600,000, the herring and salmon fisheries to $250,000, while the sealing vessels which leave the harbors of the island for more Northern waters bring back $600,000 worth of pelts. Along the wharfs of St. Johns harbor there are a number of factories where the products of these industries are prepared for market. One was a seal-oil factory dominated by an unctious pungency to which the Odors from the Oil Country—where our friend, Mr. W. Osborne, resides—would seem like attar of roses. In an upper story was a quaint and oleaginous sort of a machine with two toothed cylinders which were intended to chew up the pelts of blubber. In the intestines of the shop down below stood a big tank or boiler where the fats that had been thus masticated were digested into oil. On the top floor, under glass roofs, were shallow tanks where the clear amber-colored liquid stood to sun itself. I was given to understand that it would afterward be shipped to Italy to use for olive oil. So I suppose that after long separation it will one day rejoin company with the lobsters that are stowed away hard by, and we may hereafter be able to guess why our salads now and then have such a strenuous flavor.

Near the oil factory was a building where cod flakes were packed in tubs. After a certain weight had been heaped up in the receptacle the workman would get on it with his heavy boots and jump a few times, after which the contents were given a final snugness with a screw press. I thought of the usefulness of a hydraulic press for this purpose, but the power required was hardly sufficient to render one worth while. Not far away was a cooperage shop where heavy casks were made from staves that had been imported, I believe, from New York. This contained an equipment of up-to-date specialized machinery which would be familiar to many readers of the "American Machinist."



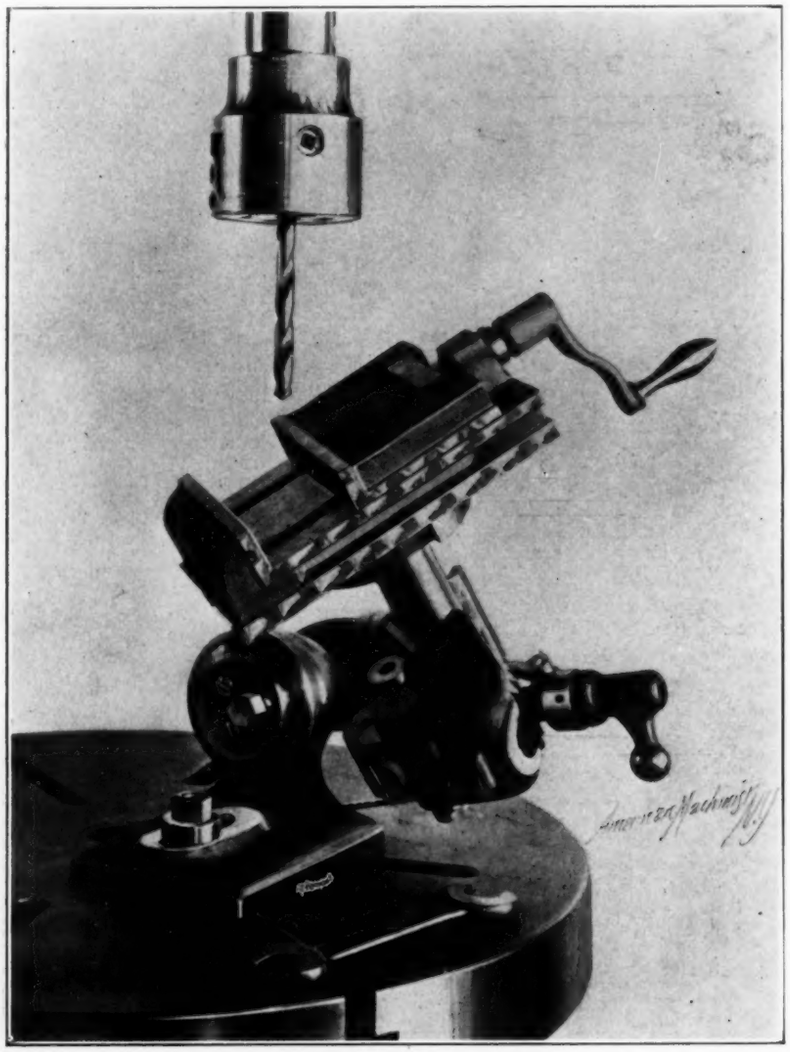
THE BATH UNIVERSAL WORK HOLDER.

Among the appliances I noticed one consisting of a set of iron claws which were let down vertically to force home upon the freshly steamed staves clumsy iron hoops that later were to be replaced with sheet-steel ones. Another machine trimmed and grooved the ends of the barrel. There was also a sort of lathe in which a boy smoothed off the outside with a hand tool. This cooperage shop is interesting because

it brings out the fact that Newfoundland is not exempt from the vicissitudes incident to the use of improved machinery. The old cooperage shops have been unable to compete with it successfully and thus have been practically ruined.

Within a few weeks past one of the disastrous fires which so often have reduced the unhappy town of St. Johns to ruins has swept along the south shore of the harbor in the region where these factories are located and doubtless has wiped them out of its track. This may afford opportunity for American manufacturers to put in some new cooperage and blubber chewing machines. There is a fair outlook, I think, for further introduction of modern appliances, such as hoisting machines, in connection with the fisheries of the island. I met a young English engineer who was on his way to look after a fishing factory which his firm were establishing somewhere on the coast.

There is unquestionably also an extensive field for modern appliances to go on shipboard. Newfoundland is believed to own more vessels for its size and population than any other country in the world, and while these are mostly small sailing ones, improvements are bound to force their way in here as everywhere else by reason of the greater effectiveness they produce, which has already been shown in the use of steam vessels for the sealing service.



THE BATH UNIVERSAL WORK HOLDER.

ECONOMIC DIFFICULTIES OF THE ISLAND.

Closely connected with the fisheries are some of the problems by reason of which Newfoundland presents a most interesting object lesson to students of political economy. From first to last the island has been kept down by blundering legislation, one fruit of which, the retardation of internal development, has already been alluded to. History tells us that at the beginning of the last century the fishermen were kept in the utmost penury, not only by their own thriftlessness, but by the "traders" who furnished them with supplies, bought their fish and equipped them with their fishing outfits, for which they were rendered dependent by being kept constantly in debt. Thus the merchant class held the whip hand all around. To-day, in spite of the fact that the island is an autonomous colony with responsible home government and that the atmosphere seems quite democratic, we find the same state of affairs prevailing. Matters are rendered still worse by an excessively high tariff which covers provisions and thus bears heavily upon the poorer classes. This tariff is largely the result of the brilliant railroad financiering by which the government practically bankrupted the country, not to mention the fact of giving away an area of land about the size of New Jersey.

It would be too long a digression to recite the history of the great Reid railroad deals, so I will depend upon your having read about them in the newspapers during the past summer, when the past contracts were reopened and a compromise effected which betters conditions somewhat. According to the impression of the deals I had formed before visiting Newfoundland, they were quite on a par with the franchise steals in the City of Brotherly Love, but local opinion seems a little more favorable to the parties concerned. I judge that the railroad people are more respectable than the corrupt contractors of the United States, although willing to take advantage of the suicidal stupidity of the government in a most cold-blooded manner.

THE RAILROAD.

The Newfoundland Railway is a narrow-gage affair running across the island from St. Johns to Port aux Basques, opposite Sydney, a distance of 548 miles, besides which there are branches amounting to 90 miles more. The tracks are laid up hill and down dale in a manner which suggests a quite respectable margin of profit in the price—$15,000 and some 7,000 acres of land per mile. Within a few miles from St. Johns I am told that rickety old iron rails are still used, and the speed is limited in consequence, but farther on one sees substantial steel rails with Carnegie's name on them. The locomotives are Baldwin and they pull the light trains up the steep grades in a manner which would excite the wonder of a broad-gage railroad man. The local passenger car accommodation is poor, but on the express trains, which cross the island three times a week, there are sleeping cars which compare quite favorably with those of the best roads in the United States. These coaches were built in Dayton, Ohio. In fact, the railroad as finally equipped may be pronounced an American one.

The shops of the Newfoundland Railway are at Whitbourne, 57 miles from St. Johns. There are one or two machine shops 80 or 100 feet long, which I regret not having visited. An elderly man, looking like a mechanic, who was standing near the train, told me that some of the machine tools in the shop were English, but that others had been built in Canada and in the United States. I understand also that the files come from Montreal

and that some of the tools—presumably the drills—are made by the Standard Tool Company, of Cleveland. While I was talking to the person referred to, a gentleman prominently connected with the railroad affairs, who was returning to Canada after the revision of the contract in Parliament, appeared on the car platform and the two effusively greeted each other as old friends in some barbarous dialect which I took to be either the extinct native Beothuk or else Highland Scotch; so the former was quite likely superintendent of the shops.

Before dismissing the railway I may remark that under the late revised contract with Mr. Reid he leases the road and agrees to run it for fifty years, but the public hold the reversion of it at the end of that period. Under the contract of 1898, however, Mr. Reid was allowed to keep it permanently. An intelligent seeming young man whom I met on the train explained this on the ground that the people thought fifty years from now the railroad would be worth nothing since it would be superseded by flying machines or something of that sort. I mentioned this explanation to an engineer of the road whom I subsequently encountered. He scouted it and said the real reason they distrusted the permanent value of the road was that they thought likely the coal fields which it was intended to open up would prove a fiasco. Whether on the whole this explanation reflects the business shrewdness of the islanders much more favorably than the former one, I will not attempt to judge.

IMPROVEMENTS AT ST. JOHNS.

At St. Johns there are seven miles of electric railway, the electrical machinery having been furnished—not by the Canadian General Electric Company, as is the case with the roads in Halifax, N. S.—but by the Westinghouse Company, of Pittsburgh. The generating station which has a capacity of 1,600 horse-power is situated eight miles out of town. It is a water-power plant, although I believe there is a steam engine auxiliary. However, when I visited the city early in August, the cars were stalled, which was ascribed to lack of water, although I also heard it stated that the road was a Reid interest and that some of the recent proceedings in Parliament had induced the tie-up.

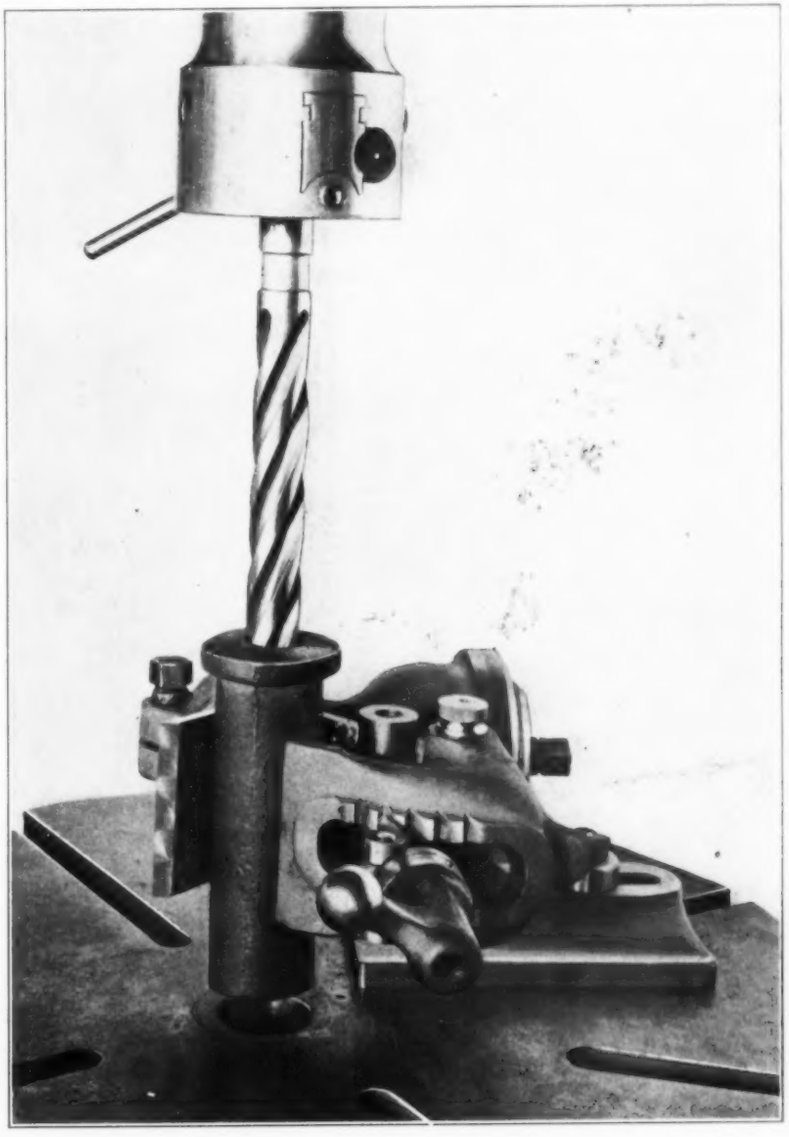
There is an electric-lighting system at St. Johns in connection with the railway and not improbably some opening for electric motors to run the machines of the local factories. Besides such works connected with the fisheries as have already been described, the city boasts of a few manufacturing shops, including a stove foundry, a boot and shoe factory, a cordage shop and a match factory.

Besides electricity St. Johns has a supply of gas and twenty or more gas engines are installed there. I noticed one also used for pumping at a station of the Newfoundland Railway and inquired who made it. A road official, with characteristic courtesy, took the pains to find out and informed me that "Fairbanks was the man's name."

MINERAL DEVELOPMENT AND PROSPECTS.

Next to the fisheries the greatest industrial feature of Newfoundland is its mining interests. I can barely allude to them here. Exuberant claims have been made for the mineral wealth of the island, but the natives one meets are inclined to throw cold water on them. The country is quite well known for its copper fields. Much ore has already been taken out, and with the increasing demand for the metal, operations will probably be carried on hereafter with assiduity. The Dominion Iron and Steel Company, of Sydney, C. B., depends upon Newfoundland for a great part of its iron ore—hematite—and mixes with this some Cuban. The chief Newfoundland mine is on Bell Island in Conception Bay, 18 miles north of St. Johns. From this mine to the pier, 2 miles away, where the ore is shipped, it is conveyed by a cable tramway. There are facilities for loading 1,000 tons an hour.

While these iron works at Sydney mine their coal at home and import their ore from Newfoundland, the island imports soft coal from Sydney, as well as some anthracite from the States. The latter costs them, I believe, some $8.50 and the former $7.50 or $8.00 a ton. Coal mines are being exploited on the island, but their success is not yet assured. It is alleged that gold has been found on the island, but this is disputed. The mineral secrets of the ground are still in great part unrevealed. Prospects for quarries of granite and other building stones seem unlimited. The bearing of all these facts upon present and future demand for machinery is easily to be inferred.



THE BATH UNIVERSAL WORK HOLDER.

FORESTRY ON THE WEST COAST.

The development of the west coast of the island is retarded by the French treaty

fishing rights. These are a source of constant irritation, which some time after the expiration of the present *modus vivendi* must be brought to a head. The forests of this region, however, subserve quite an extensive lumber industry, and wood pulp manufacture is now attracting considerable attention. As the train wound down the beautiful Codroy valley I noticed a lumber mill which had recently been built beside a lake. It was run by steam, despite the seeming abundance of water power in the vicinity. One appliance visible in connection with this mill was particularly interesting. A trestle work extended out over the pond to a natural or artificial island of some sort, and on this trestle moved an endless conveyor which carried along the refuse, shavings, etc., of the mill and dumped them at the end. Here they dropped into a bonfire which seemed to be kept burning continually, like the fires in the Vale of Tophet. I was assured that this ingenious device was a standard one in Newfoundland, and indeed I saw the same shortly afterwards at an older mill in Nova Scotia.

RACK CUTTER.

STRIKES.

Newfoundland is not so far out of the world as to have escaped labor troubles. In the course of a conversation on the American steel strike, an ex-member of the local Parliament, who was on the steamer going from Halifax to St. Johns, said they had had some trouble of the sort at Bell Island, but that they had arrested a number of the participants and all was now lovely. This seemed to imply that rather a "paternal" system of government prevailed on the island; but from what I have gathered elsewhere, I judge that personal liberties in Newfoundland are not materially different from those in other English-speaking countries, and that if repressive measures were taken, there must have been some sort of violence to call them forth.

SNAKES IN NEWFOUNDLAND.

There are practically no snakes or other reptiles in Newfoundland—only bugs, and lots of them.

IMPORT TRADE.

As already mentioned, Newfoundland has a very high tariff, this being intended for revenue, not for protection. It is variously stated to average 30 to 50 per cent. I have not seen the schedule on machinery, but understand that it is high, like the rest. There is, however, no preferential duty to any country. In spite of the high rates the custom house officials display the same sweet reasonableness in their methods as do those of Canada and every other country of the world, with one exception.

For the year ending June 30, 1900, the imports of Newfoundland amounted to $7,497,147, of which $2,224,353 worth were from the United Kingdom, $2,805,490 from Canada and $1,993,505 from the United States. This showed a gain of about 15 per cent. as compared with the preceding year on the part of the United Kingdom, and nearly 35 per cent. on that of Canada, the amount from the United States showing little change. It is to be noted, however, that the imports are made up chiefly of clothing, fishery supplies, provisions and the like staples.

THE OUTLOOK.

Unless appearances go by contraries, Newfoundland will meet any commercial overtures American manufacturers may be disposed to make more than half way. There are few parts of the civilized world where the visitor from abroad is made so welcome. At every turn a disposition is shown to facilitate rather than to impede his movements. The country is provincial in a creditable way, and is free from arrogant Briticism as it is from Yankee "smartness." The extensive use of American-made appliances at the present time shows that there can be no prejudice against them. In some respects it would be a positive advantage to deal with the States. For instance, the difference between the English and ourselves in reckoning the diameter of shafting—they following the actual dimension and we the size in the rough—causes confusion where American pulleys are to be fitted on English shafting, or *vice versa*, and it would save trouble to order everything from start to finish from the nearby markets of this country.

Arrangements are being made to increase the steamship facilities for passenger and freight traffic between Newfoundland and the United States, and this, with increasing use of the trans-insular railway, may effect great changes in a few years.

Consul Carter reported a year ago that if American houses would send agents with samples and competent men to study methods and familiarize themselves with the wants of the market our exports to Newfoundland might easily be doubled. I believe that he is right, and, moreover, that there is a great industrial future for the undeveloped interior of the island. At present, however, the unprosperity of the people must be taken into account. A well-to-do man, according to the Newfoundland definition, is one who keeps his debts paid. The people cannot afford to buy improved machinery as a luxury. If it is not too expensive at the start, if its economy can be demonstrated, and especially if profitable new channels for its application can be opened up, I think they will accept it yet more gladly than it is offered.

E. P. B.

Rack Cutter.

The engraving represents a semi-automatic rack cutter recently built by F. E. Reed Company, Worcester, Mass. The general construction and proportions are made clear by the photograph. The table has quick-return motion by power, and is gibbed to the bed. The chuck for holding the racks is of convenient form, 54 inches long, and racks of this length can be cut with one setting. Racks longer than this can be cut by sliding them in the chuck.

The cross-rail is made to raise and lower in order to cut racks of any desired thickness. The divisions for cutting any pitch of rack are obtained by means of a screw, shown in the cross-rail, and a gear connected to a dial conveniently located at the end of the cross-rail. By use of the gears furnished with the machine any division or pitch can be cut.

The illustration shows the machine at work on five steel racks with two cutters, but there is ample power for running more cutters if desired. The cutter arbor is driven by spiral gears and has an adjustable arm supporting the outer end of it, and this arm has also a bearing against the rail.

F. E. Reed Company have had a rack cutter of similar design running in their works for the last ten years, with good results, and in making this new machine they have improved on the old one in many ways. It weighs 6,200 pounds, with countershaft.

Letters from Practical Men

How We Enlarged Our Shop.

Editor American Machinist:

The rapid growth of business within the past few years made it necessary to increase our plant, which already occupied every foot of available ground, being built on an island, with the river on two sides and the street on the third (see Fig. 1). The buildings, with the exception of No. 1, had basements, the floors of which were the solid rock. Having no ground outside the buildings on which we could build, except the yard, which was already too small, we decided to try to make use of the basements. Our product consisted of machinery requiring large numbers of cylinders, 48 inches in diameter and from 8 to 15 feet long, as shown by Fig. 2. The work on these was all done on the floor of shop No. 2. The tools used were 60-inch lathes, machines for grinding the surfaces of the cylinders, drill presses and other tools. All these cylinders had to be taken in at the door shown and carried along the floor to the different lathes. After being finished and painted they must again be shipped through the same door. As the number of these cylinders in process at one time was seldom less than twenty, and as they occupied a large amount of room, the bringing them in and again shipping them interfered greatly with the work in other parts of shop No. 2. We decided to move all these cylinders to the basement and to machine the cylinders there. The basement in shop No. 2 was 7 feet high, the floor being rock. In order to handle the work with overhead lifts and travelers, we wanted at least 12 feet clear of the girders overhead. This made it necessary to remove 5 feet of very hard rock. We did this over the entire floor by drilling and using small charges of dynamite. The floor above was supported by two rows of columns, all of which were removed one by one, and as the rock was cut down, new columns were set.

The basement of shop No. 3 was also 7 feet high. In this we desired to finish the cylinders after the machine work was done. Therefore we wanted to avoid removing the rock. It was, however, necessary to lift the pieces, turn them end for end, and manipulate them in various ways. How this was accomplished will be described farther on.

Fig. 2

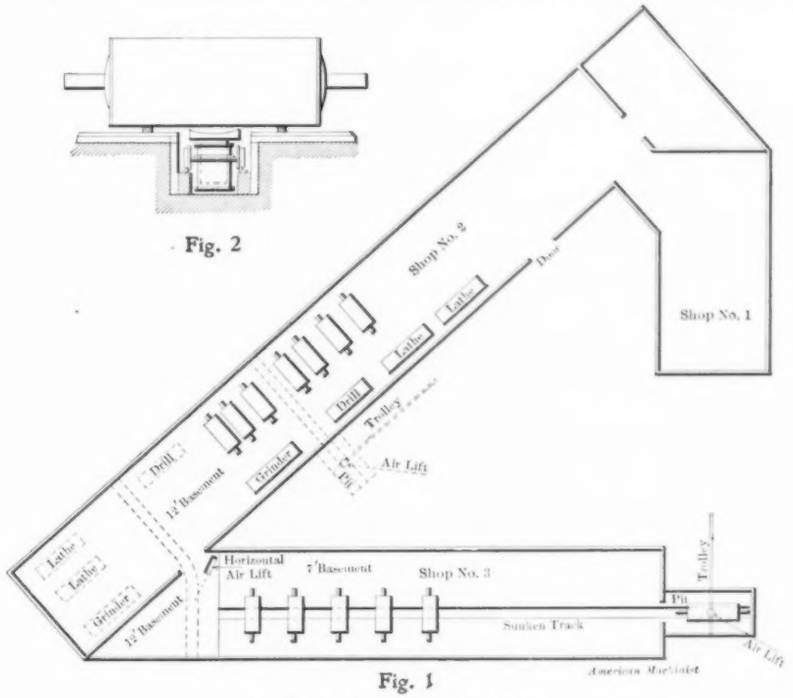


Fig. 1

HOW WE ENLARGED OUR SHOP.

The dotted lines on the plan show the location of the tools in the basement, and the tracks. It also shows a pit in the yard, over which we placed a lift and trolley. With the new arrangement the cylinders were delivered from the foundry to a position under the overhead trolley in the yard near the pit, they were lifted, run forward and lowered on to a truck, then pushed into the basement under the overhead system of trolley and lifts. After passing through the various tools, they were placed on another truck and were run into the basement of shop No. 3, a small part of the floor of which had been lowered to the same level as that of basement No. 2. When the rolls were finished and painted they were passed through the door shown and were lifted from the pit to a wagon truck for shipment.

Fig. 2 shows a truck running on the sunken track. The truck is a combination of truck, air jack and turntable. It is simply an air cylinder fitted with a piston of sufficient area to lift the greatest load we may want. On top of the piston is a concave table. Air is admitted under the piston, lifting the cylinder clear of the floor and allowing it to be turned to any position desired. The truck is also used to carry the cylinders through the door into the pit and under the lift by which they are loaded on the wagon.

By this arrangement we have much increased our available space and have placed the heavy tools on solid foundation, increasing their output. The cylinders enter the shop and continue to pass forward until shipped, without interfering with the work and tools on the other shop floors. The combined air jack and truck does the work for which it was intended very satisfactorily. The cylinders can be handled with the greatest ease, turned end for end or moved from place to place by two men. They weigh from 2 to 4 tons each.

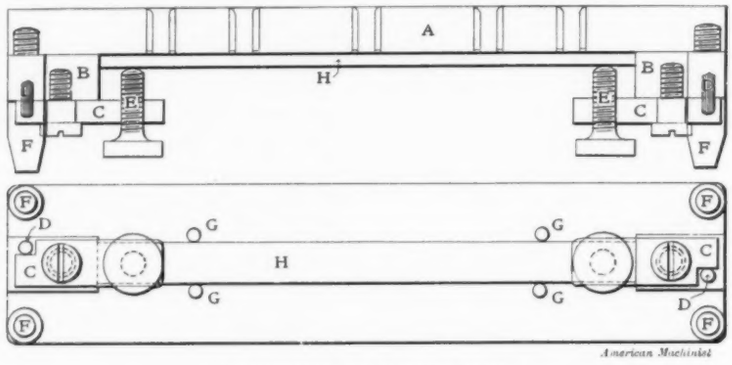
B. W. T.

Improving the Jig.

Editor American Machinist:

On page 810 Mr. Joseph V. Woodworth gives an excellent description of a jig for drilling four holes in a tool-steel plate. He states that the plates drilled in the jig are "finished all over and accurately ground to gage." If this is the case, why is it necessary to have the fastening screws *I* and *H* to locate the blank and hold it securely against the pins on two sides, when a sufficient number of perma-

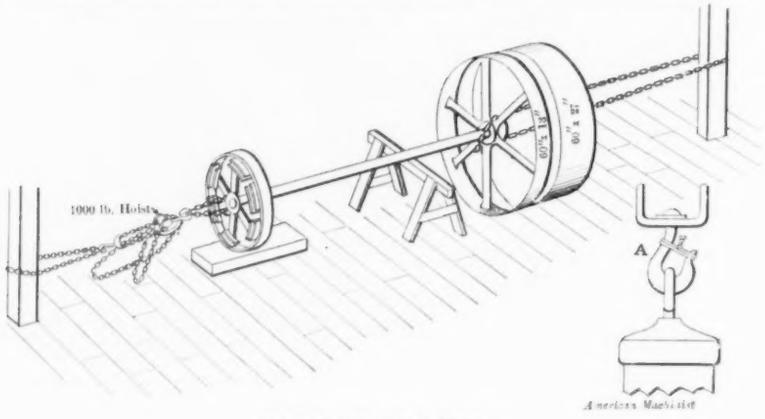
nent stops arranged on the sides and ends would answer the purpose much better, and evidently save time and expense in both the construction and use of the jig. Another undesirable feature in his jig are the fixed extension pieces of flat machine steel that hold the clamping screws *K*. Their position necessitates the sliding of the work under them when placing it in the jig, and to some extent it also retards the quick removal, and also makes it essential for the drill-press hand to take a bunch of waste on the end of a stick and push it between the extended ends and the body casting to wipe away the chips and oil in order to have a clean surface for a subsequent drilling.



A SUGGESTED JIG IMPROVEMENT.

As a simple way of constructing a jig that in a measure avoids those objectionable points in Mr. Woodworth's jig, I submit the two views [half size] of a similar tool for drilling the five 3-16 inch holes in a machine steel plate, ⅛x½ inch and 6 inches long; the work is of uniform size as to length and width. The body casting *A* is a flat piece planed to about ½ inch thick, 1¾ inches wide and of sufficient length, which in this jig is 2 inches over the extreme length of the work. The elevations *B B*, cast on, are to act as end stops for the material to be drilled and to support the swivel pieces *C C*, of flat machine steel. These pieces of steel are fastened to *B B* by ¼-inch shoulder screws, which hold them securely and yet permit them to swing freely to one side clear of the work, to insert or remove it. Their ends that extend inward over the work are drilled and tapped for the binding screws *E E*. The ⅛-inch steel pins D D are for stops, which limit the movement and bring the clamping screws directly over the center of the work. The legs *F* are made from tool steel, with two flat sides and ends, hardened and screwed tightly into the jig, their faces lapped parallel with the top of the casting. The flattened sides are merely for a wrench when screwing them home.

The work *H* when placed in the jig is held in proper position by the pins *G* on the sides and the elevations *B B* on the ends and clamped to the body of the jig by the screws *E E*. When operating this tool it is only necessary to loosen the clamping screws, swing the steel pieces *C C* to one side, remove the work and clean the jig, ready for the next piece. While I do not wish to unkindly criticise Mr. Woodworth's style of jig, I am compelled to believe, from knowledge obtained by practical experience, that as a means of rapidly handling work of this class the tool herein described for drilling is superior to his and offers advantages not to be overlooked. C. H. ROWE.



EXPERIENCE WITH HOISTS.

About Hoists in the Shop.

Editor American Machinist:

Mr. L. O. Danse on page 1036 relates a peculiar accident with a pneumatic hoist which comes very near my own experience. In my case the hoist was only a home-made hydraulic affair, and when the piston leathers became worn, so that there was some leakage, the cylinder would collect air during a period of idleness, as over night. The hoist never jumped off the hook, but it came very near it once, and the precaution was taken, as illustrated at *A*. This is merely a piece of wire twisted around the hook, and it did the business as well as though it was a C-hook with a latch costing several dollars. This operation of closing the end of a hook is technically called "mousing" and is a very common trick on board ship and ought to be better known and more often practiced among mill hands.

Not long ago I had a job of taking some heavy pulleys off a long shaft. The shaft was 4 inches diameter and some 16 or 18 feet long, and had a 40-inch friction clutch forced on one end. The pulleys to be removed are shown in the sketch and were respectively 60x27 and 60x13 inches. After the shaft was on the floor it was a simple matter to horse up the pulley end of the shaft and work the pulleys down somewhere near the end of the shaft, but here was where the trouble began. As shown in the sketch, the pulleys were resting on the floor and the shaft would drop on the horse when it came out of the hole. The other end of the shaft was blocked up to make the shaft pull out straight. The pulleys were chained to a post, as shown, and a 1,000-pound Harrington hoist was put on the other end. One man held the chains on the sheave, while another man did the pulling, and in less than five minutes the pulleys were off. This not only saved time, but saved all that pulling and hauling that is so heart-breaking for men to do and for bosses to look at. Does anyone make a chain hoist, or, rather, a "chain puller," to be used in this way? If they do, I intend asking the "super" to buy us one.

K.

Making Blanking Tools with a Shearing Cut.

Editor American Machinist:

While various correspondents have shown how to make nearly all sorts of punches and dies, especially of the more elaborate kinds, I have seen nothing intended particularly to show how the shear should be given to larger dies so that they may cut easier than when flat. With this object, therefore, I show a very simple punch and die made to produce a familiar piece of work.

Several years ago I was employed in a small factory where they made a large variety of sheet-metal goods and therefore most of the work of the tool-makers was die-making. Near our factory was a cutlery shop that had no facilities for making the dies used in their business, so our company agreed to do their die and tool-making, and I submit a sketch and short description of the smallest die and punch they brought us to make, the principal feature of which was the "shear" on the

die. The blank was for a kitchen knife, and was blanked out of flat steel, No. 18 Brown & Sharpe gage. The power required to blank out a long, narrow, flat blank like this is greater than for a round blank of the same area, but we had no trouble with the working of the dies after we had gotten the proper "shearing" cut, and our blanks came out quite straight.

Fig. 1 shows the blanking punch, which was made from a solid forging of tool

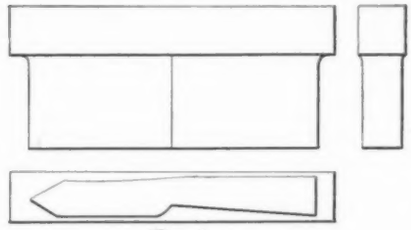


Fig. 1

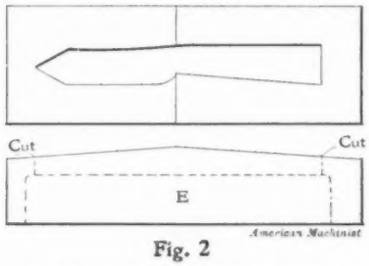


Fig. 2

BLANKING TOOLS WITH SHEARING CUT.

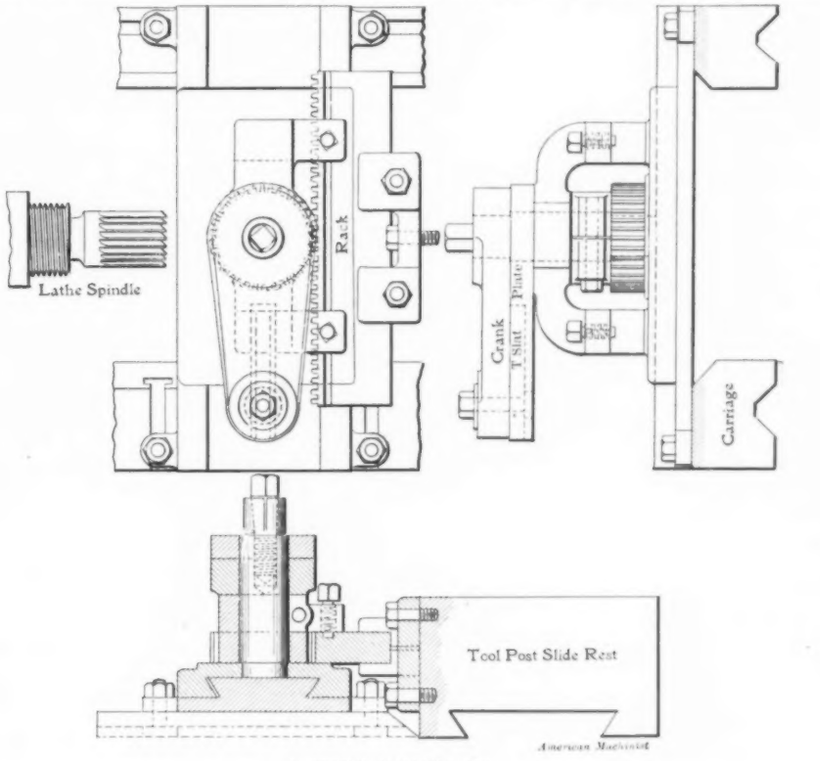
steel. Fig. 2 shows the die, which was "backed" out or cut away under, as at *E*. In the front and end views of the die is shown the approximate amount of "shear" that we usually give dies of this class. Dies for blanking pieces much larger in area, as butcher and carving knives, we make in halves, otherwise they are made just the same as we make our kitchen knife-blanking tools.

Of all the various methods of hardening dies of the foregoing description, we have found none better than a solution of chloride of sodium (common salt) in water, as it makes the water a much better conductor of heat, and will therefore cool the piece of steel quicker, and in turn makes the steel much harder, and at a lower temperature than with clear water. Still further, there is a slight chemical action which causes the scale to drop off and the hardened piece comes out of the solution considerably cleaner than when clear water is used. "MATTATUCK."

A Crank Milling Rig.

Editor American Machinist:

We had cranks in the Pushfinger shops. Nothing surprising in that, you may say, for I suppose they exist in all shops; but the kind that troubled us were of cast iron, and they had to be finished all over. The only tool available was the "boy's" lathe in the toolroom; this, fortunately, had a cross feed. The sketch shows how we milled the edges of the web and all around the hub, by mounting a vertical spindle on a slide bolted to the carriage between the tool-post slide and the headstock. A clamping arrangement was fastened to tool-post carrier by screws. This clamp of course traveled with it, and by tightening the clamping screws a rack also was made to move with it. The rack could also be clamped to the milling fixture by means of the two flat-pointed set-screws. When these screws were tightened the fixture moved along with the tool-post carrier as impelled by the cross feed screw; but when the set-screws were loosened the points, being in a groove, served as a guide for the rack, which then imparted a circular motion to the vertical spindle by means of a pinion clamped upon it. The crank to be milled was fastened to a plate on the upper end of the spindle. This plate was fast to the spindle and had a



A CRANK MILLING RIG.

T-slot and a bolt to secure the small end of the crank to the plate. The upper end of the spindle was split and bored for a taper plug screw to insure a good fit for the crank on the spindle. The plate, as shown, is slightly larger all around than the crank, while, as a matter of fact, it should be a trifle smaller, to allow the end-mill to overlay the crank.

The manner of operating the device is to line up the side of the crank next to the mill with the mill at the small end of the crank. Clamp the rack and mill along the side of the crank. When the work spindle came in line with the lathe spindle we had a dowel-pin (not shown) to drop into the slide of the fixture. By loosening the set-screws the rack then caused the spindle and work to revolve for milling around the large hub; then the dowel was taken out, the feed reversed and the other edge was milled. The pitch line of the pinion was about the same diameter as the crank hub to be milled, thus giving about the same feed in the straight as in the circular milling. The advantage in having the pinion clamped to the spindle was to secure easier adjustment for the work and also to secure an unlimited amount of feed from the cross-feed screw. This idea may not be new to some readers, but was new to us and worked like a charm, as the boy could keep it going while still tending the tool window. ISAAC MORGAN.

Mounting Blueprints.

Editor American Machinist:

The following experience in mounting blueprints may be of help to draftsmen and blueprinters who have prints to mount for shop use. For mounts I use bookboard, which can be obtained (cut to size) from dealers in book-binding supplies, or can be cut by a fine tooth shop bandsaw. After sawing, the edges can be smoothed with sandpaper. When the mount is ready prepare the paste. Excellent results have been obtained from a powdered paste which can be mixed with cold water, but care must be taken to thoroughly mix powder and water to the consistency of cream, which can easily be done with the fingers. Let the print soak thoroughly in water for a few minutes, after which place it face downward on glass, and with blotting paper remove the surplus water that has collected in small pools. Apply paste with the fingers, making sure that the entire surface is thoroughly covered with a thin film only. Lift the print by

grasping the ends by thumbs and forefingers, reverse print, and let it settle on mount by a catenary curve. Then bring down the ends, and with a piece of paper under the palm of the hand, remove all air spaces by pressing from center to the edges. Allow the mounted print to dry slowly with weights on the edges to prevent excessive warping. When dry apply two thin coats of white shellac varnish.

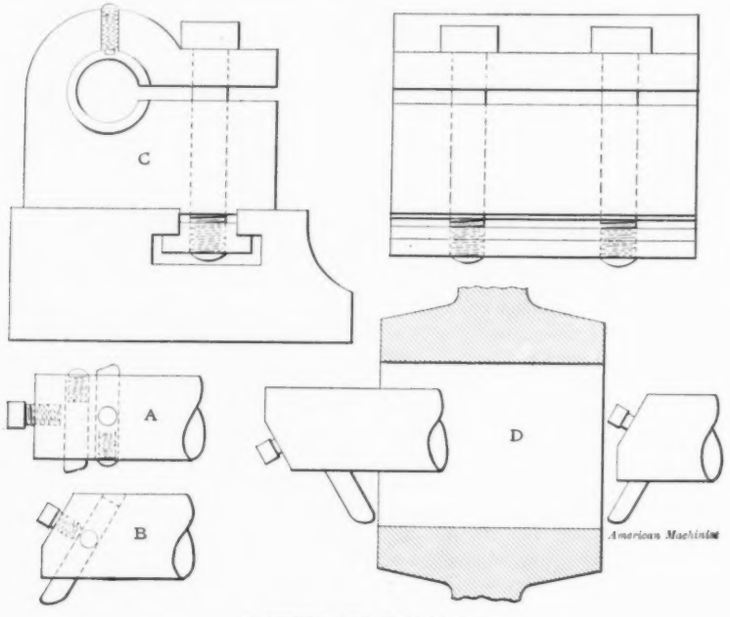
WM. C. TERRY.

A Boring Arrangement.

Editor American Machinist:

The sketch shows a tool which I have devised and have found to be of great service and adaptability. *A* shows one end of the tool or bar and *B* may be on the other end of the same bar, or it may be made separately. The bar is held in the block *C* and may be set to reach out just far enough for the depth of the hole to be bored. Bars of different sizes may be held in the same block by the use of bushings, one of which is shown in place. The little headless screw locates the bushing correctly. *D* shows how the tool may be used for facing each end of a hub at the same chucking with the boring. In the end of the bar shown at *A* the tool nearest the end is the roughing tool; this is held by the square-headed screw at the end of the bar. The other tool is for finishing and is held by a headless screw on the side. Both tools are set out endwise by headless screws at the back of them. Both of these screws have holes running clear through them lengthwise to stick in a wire nail and back out the cutter when it has to be ground. The steel used for the cutters is ordinary round self-hardening steel.

The boring bar *A*, if there are several holes alike to be bored, can be used with the thread-cutting stop or gage, and when the tool is once set it will be right for a number of successive holes, or until the cutters need grinding. Two pairs of jam nuts will be required on the gage screw, one pair to stop the tool holder when it is moved forward to set it for the roughing cut and the other when it is moved toward the back of the lathe for the finishing cut which is taken at the back side of the hole and with the lathe running backward. When the tools are thus set correctly the job can be left for an apprentice. The chucking of the work and the looking after the job should be a good lesson for him and produce cheap work for the boss.



A BORING AND FACING BAR.

R. A. LACHMANN.

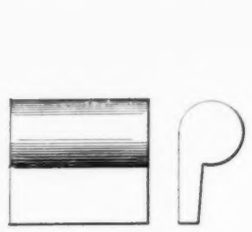


Fig. 1

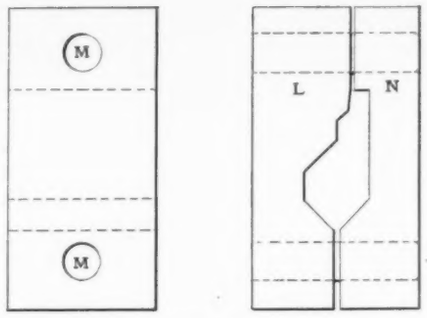


Fig. 2

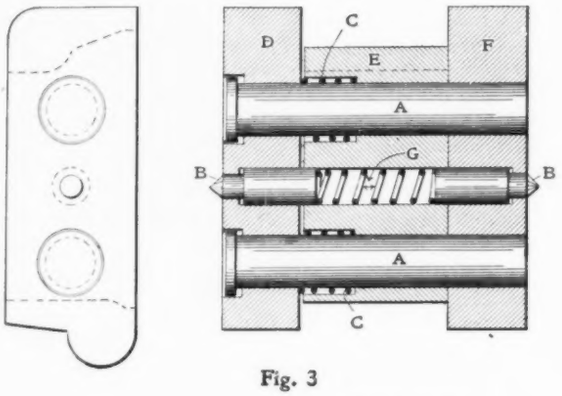


Fig. 3

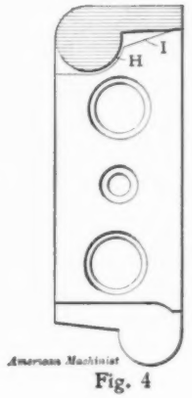


Fig. 4

JIG FOR FILING PAWLS.

Jig for Filing Pawls.

Editor American Machinist:

The jigs shown were designed for filing pawls of the form shown in Fig. 1. The stock to be removed did not exceed .03 inch, and in many instances was less than .015 inch. Fig. 2 is simply a pair of clamps used for facing the flat ends of the pawls. The pins *M* are made a tight fit in part *L* and a neat sliding fit in part *N*. The rough pawl is placed in the opening shown and the ends are filed even with the faces of the clamps.

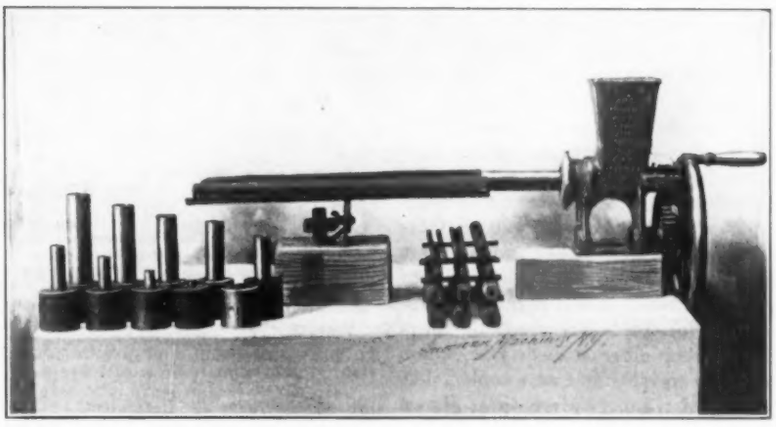
Fig. 3 shows a jig for filing the sides of the pawl. The center piece *E* is made slightly less in width than the finished pawl, about 1-64 inch. The pins *A* should be driven tight into the pieces *E* and *F*, and the holes in *D* are relieved to slide freely on the pins, but without play, as any lost motion would affect the accuracy of the jig. The springs *C* are for releasing the pawl by forcing the piece *D* away from it when the pressure of the vise has been removed. The amount of this movement is controlled by the depth of the counterbores for the hands of the pins and need not exceed 1-64 inch. The points *B* are to prevent the jig from falling from the vise when it has opened to release the pawls, and also to act as centers upon which the jig can be rotated when it is desired to turn it end for end. It serves to keep the jig in position and saves a

great deal of time in handling. The spring *G* is made quite strong, and center punch marks are placed in the vise coppers to receive the pointed ends of the pins, which are made 45 degrees. Springs *C* can be dispensed with if it is so desired, depending upon the center spring *G* to do the work. It would not act so quickly upon the piece *D*, however. At the same time it would have an advantage, in that the vise could be opened just sufficient to allow the jig to rotate and not far enough to allow the shoulder of pin *B* to come in contact with piece *D*, thus keeping *D* in contact with the pawl while manipulating the jig for the purpose of filing the round corner and the edge. Fig. 4 is a view of the jig with part *D* removed. The top shows the outline of a finished pawl and spots *H* and *I* are made to clear the finished article to the extent of one-half the amount of stock that is to be removed. The pawl is filed first in this end of the jig. There is no clearance as here spoken of in the other end. The jig is made of tool steel and both ends of *E F D* are hardened. MAC.

Some New Things.

A CORE MACHINE.

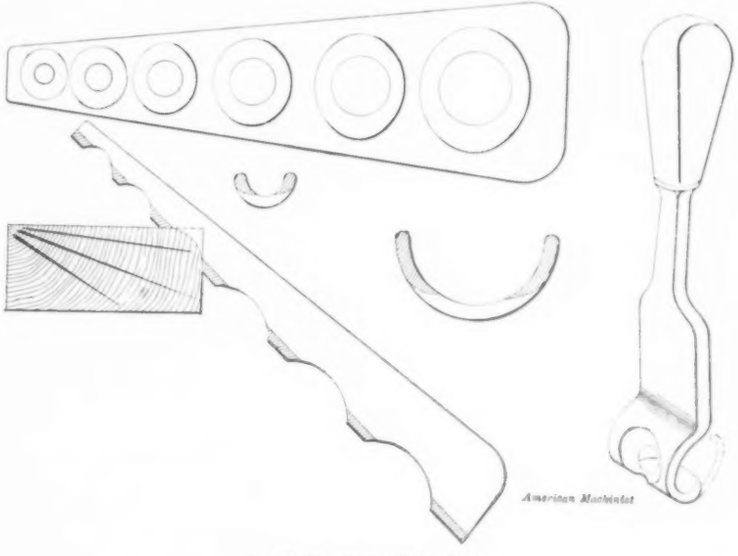
The cores most numerously used in nearly every foundry are straight cores of uniform size and shape and usually round. The machine here shown, which requires no explanation as to the details of its construction—it is very much like the familiar sausage stuffer—makes round cores of any length from ⅜ to 1½ inches, also square, hexagon, D or other shapes. The cores are solid and do not require to be pasted together. It will turn out a core 24 inches long every minute, or 120 feet per hour. It may be driven by power or turned by hand. It is named the Wadsworth & Corwin core machine, and is made by the Railway Speed Recorder Company, Kent, Ohio.



A CORE MACHINE.

A CORNER ROUNDING TOOL.

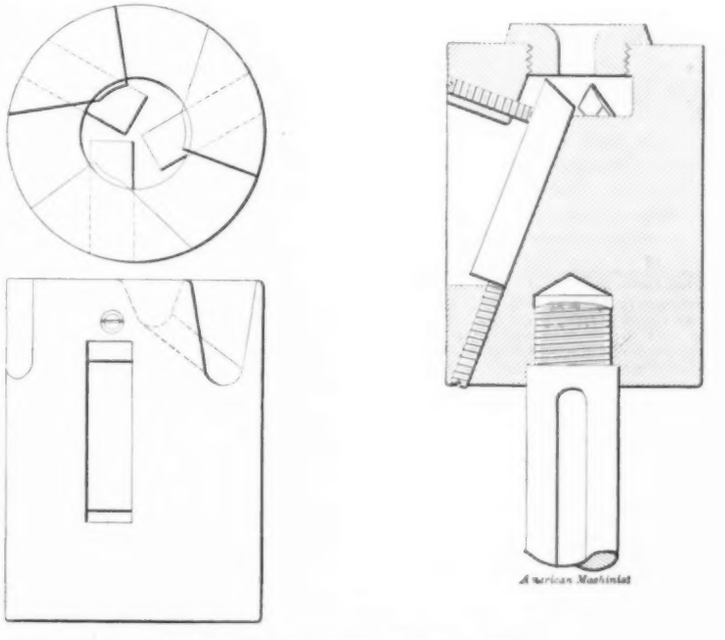
The engravings shown herewith clearly illustrate the construction of a tool recently patented for rounding the corners of patterns or other wood work. A piece of sheet steel is formed into a section of a cone and openings are made in it as indicated. These when applied to a corner will cut it away until the corresponding radius is obtained when they will cut no longer and thus the tool forms its own gage. Two different styles of it are shown. It has been patented by Benjamin Wood, Kansas City, Kan.



A CORNER ROUNDING TOOL.

TOOL FOR ROUNDING OR POINTING THE ENDS OF BOLTS.

The accompanying cut, adapted from the drawings of a recent patent, the assignee of which is the Deering Harvester Company, of Chicago, shows a tool for pointing or rounding the ends of bolts. Little explanation is required. The head is screwed upon a suitable re-



TOOL FOR ROUNDING THE ENDS OF BOLTS.

volving spindle, the ends of the bolts are thrust into the hardened, bell-mouthed steel bush in front, and the three cutters do the rest. These cutters are set in slots cut at an angle which experience has shown to be best, and are held to a bearing by the screws at the sides and adjusted endwise by the screws bearing against their ends. The cutting faces of the cutters are radial, and as here shown they will form a conical end of about 90 degrees. They may of course be ground for any other angle or for a semicircular or other shape. The cutters are easily removable and adjustable. The machining of the slots precisely as shown is not the simplest job in the world.

The up-to-date record for rock drilling has recently been made at Butte, Montana. For a purse of $500 two men, Bradshaw and Freethy, drilled through 55 inches of granite in 15 minutes.

Baker & Co., of Newark, N. J., who are platinum refiners, publish a little pamphlet entitled "The Alchemistic Symbols: A Brief Account of Their Origin and Meaning," by Jas. Lewis Howe. This gives a very interesting account of the origin of these symbols, and we think the pamphlet will be found very interesting by most of those who have to do with the metals. We believe it is sent gratis by the company named.

We have received a pamphlet explaining the nature of the business carried on by the Manufacturers' Appraisal Company, 515 First National Bank Building, Chicago, Ill. The business of this company is to make examinations of manufacturing plants and to furnish a written report, which reports are found very useful in the case of sales, either of the whole plant or of an interest in it, in case loans are to be negotiated or where insurance losses are to be adjusted. This company has made such examinations for a number of the best known manufacturing establishments in the country, who commend it highly, among these being the Elgin National Watch Company, the Link Belt Machinery Company, The Long & Allstatter Company, and others.

Miscellaneous Wants.

Advertisements will be inserted under this head at 25 cents a line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Gear Wheels, gear cutting. Grant; see p. 22.

Caliper cat. free. E. G. Smith, Columbia, Pa.

Punches & dies. Wal.M.Wks., Waltham, Mass.

Gas engines. Northern Engin'r'g Works, Detroit, Mich.

Wanted—Large horizontal boring mill. Materne Mfg. Co., St. Louis, Mo.

Light machinery built to order. American Machine Co., Wilmington, Del.

Light and fine mach'y to order; models and elec. work specialty. E. O. Chase, Newark, N. J.

Book "Dies and Diemaking," $1, post paid. J.L.Lucas, Bridgeport, Ct. Send for index sheet.

Elec. & mech. designing & drawing, also ideas developed. Box 709, Schenectady, N. Y.

Selden Packing for Stuffing box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., New York.

For Sale, Cheap—About 600 ft. second-hand coal elevator and conveyor; complete. Box 117, AMERICAN MACHINIST.

See 12 presses & dies for sheet-metals, S. E. cor. Machinery Hall, Buffalo Exposition. Ferracute Mch. Co., Bridgeton, N. J.

Special tools, models, fine light mach'y and foundry work wanted. Murray Mfg. Co., Richmond Valley, Staten Island, N. Y.

Engines for Sale.—2 Van Dusen gasoline, 25 H. P. each; 1 Otto gas engine, 10 H. P. The J. H. Day Co., Cincinnati, Ohio.

F. J. Stokes Machine Co., 13th and Noble sts., Philadelphia, cut light gears, cams and duplicate small machine parts, in quantities.

Wanted—Second-hand belt compound air compressor, about 250 cubic feet capacity free air per minute; must be in first-class condition. Box 118, AMERICAN MACHINIST.

For Rent—Complete, fully equipped modern machine shop in Alexandria, Ind.; steam heat, electric light and power free; 1,000 hours' work per annum guaranteed; particulars on application. "Glass," care AM. M.

Purchaser for small manufacturing plant; lot, 100x180 feet; machine shop, 32x68, two story, with line shaft and gasoline power; foundry, 40x54, new modern equipment; good location; for sale cheap. Hart-Parr Co., Madison, Wis.

A prominent typewriter manufacturing company have just opened a department for the manufacture and sale of novelties. Responsible parties having something of this class to turn out will oblige by addressing "Work," care AMERICAN MACHINIST.

Institutions retiring from business having machine tools, brass and wood working machinery will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach. Co., 55-59 Woodbridge st., W., Detroit, Mich.

Wanted.—Apprentices, machinists, toolmakers, draftsmen, do you want to increase your salary? Can you afford to be without a copy of Saunders' greatly enlarged edition "Hand Book Practical Mechanics"? Tough problems, that come up daily in the shop, figured out by simple arithmetic. Shop kinks, rules, tables, taken right from note books of best mechanics in the country. Pocket size, price, post paid, only $1, cloth; $1.25, leather; agents solicited; big money. C. H. Saunders, 216 Purchase st., Boston, Mass.

Wants.

Situations and Help Advertisements only inserted under this head. Rate 25 cents a line for each insertion. About six words make a line. No advertisements under two lines accepted, and no advertisements abbreviated. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded. Applicants may specify names to which their replies are not to be forwarded; but replies will not be returned. If not forwarded they will be destroyed without notice. Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents.

Situations Wanted.

Machine shop foreman, at present employed, wishes to change; hustler. Box 128, AM. M.

Competent draftsman on fine work wants to make a change. Box 132, AMER. MACHINIST.

An experienced tool and case hardener, steady and temperate, wishes work with good company. Box 129, AMERICAN MACHINIST.

Will entertain proposition as machinery salesman; thorough mechanic; 10 years' road experience; can start November 1. Box 119, AMERICAN MACHINIST.

Engineering graduate, age 30, shop and drawing-room experience, now holding position of superintendent, desires change. Address Box 108, AMERICAN MACHINIST.

A practical foreman and superintendent, with 25 years' experience in engines, dynamos and general machine shop work, desirous of position. Address Box 112, AMER. MACH.

Situation as superintendent or general foreman, by practical machinist; wide experience as workman and in charge of shops; fine executive; good manager of men; finest reference; will go anywhere to advance his interests. Box 121, AMERICAN MACHINIST.

Superintendent wishes to correspond with parties desiring the services of a practical, thorough mechanic, up to date in modern methods, duplication of work, cost-keeping systems, shop management; best references furnished. Box 89, AMERICAN MACHINIST.

Superintendent, of vast experience on engines, hoists, electric cranes, air compressors, stamp mills, rock crushers, refrigerator, pneumatic and general mill machinery; familiar with modern shop practice, cost systems and cost reduction especially, open for engagement December 1. Address Box 130, AM. M.

Position wanted by up-to-date man with thorough experience in gas engines, also steam engines, skilled in organizing and handling agencies; first-class salesman; accustomed to handling large contracts; prefer position as sales manager, or will take territory; none but thoroughly responsible firms need answer; open for engagement December 1. Address F., Box 120, AMERICAN MACHINIST.

Help Wanted.

Wanted—A first-class toolmaker, by The Lane & Bodley Co., Cincinnati, O.

Wanted—A first-class draftsman familiar with oil and gas engines. Box 126, AM. M.

Wanted—Good lathe, planer and floor hands; state experience. The Goulds Mfg. Co., Seneca Falls, N. Y.

Wanted—First-class machinists on engine work; no labor trouble. Address Reeves Machine Co., Trenton, N. J.

Molders; 35c. per hour; engine and general job work; no bench men. Denver Engineering Works, Denver, Colo.

Wanted—A first-class draftsman familiar with designs of steam engines and plants. Box 125, AMERICAN MACHINIST.

Wanted—Iron machine shop foreman, familiar with valves and fittings; none but experienced men need apply. Box 93, AM. M.

Wanted—Foreman for machine shop, experienced in construction large valves and hydrants; location, near Troy. Box 94, A. M.

Wanted—First-class draftsmen on marine engine work. Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, New York City.

Good patternmakers, both wood and metal, desiring steady employment, will find it to their advantage to apply to the General Electric Co., Schenectady, N. Y.

Wanted—First-class machinist for 10 ft. boring mill; also toolmakers and lathe hands; good wages; steady work. Apply Michigan Brass & Iron Works, Detroit, Mich.

Wanted—Draftsmen experienced on direct-current motors and generators; give full particulars as to experience and salary expected. Address "Draftsman," care AMER. MACH.

Wanted—A foreman on machine tool work; must have experience in both lathe and vise work; permanent position and good salary to right man. Address U. C. Y., care AM. M.

Wanted—Competent foundry foreman; one who understands mixing of iron and can handle men to advantage. Address, with reference, "Atlanta," care AMER. MACHINIST.

We invite applications from machinists and moulders; give references, experience and wages expected; work on air compressors. Franklin Air Compressor Co., Franklin, Pa.

Wanted—Three or four good machinists to work in shop in Western Pennsylvania building engines and general machinery; give age and experience. Box 96, AMER. MACHINIST.

Wanted—Foreman of business ability and mechanically skilled to supervise construction and assembly of fine clock movements used in a specialty. Address Box 97, AMER. MACH.

Wanted—Two good mechanical draftsmen, experienced in general and heavy work; applicants will please state age, reference and salary required. Box 91, AMER. MACHINIST.

Wanted—An experienced draftsman on fine tool work, in Central Pennsylvania; steady position; good work. Address, giving age, experience and pay desired, Box 122, AM. M.

Wanted—Several young married men, experienced on lathe or planer, also man for manufacturing work on universal grinder. Apply at once to Hyatt Roller Bearing Company, Newark, N. J.

Wanted—Brass foundry foreman who understands molding machines and capable of handling men to best advantage; one familiar with valves and fittings preferred. Box 95, AMERICAN MACHINIST.

We are increasing our line blacksmith tools, redesigning our old line, and want mechanical draftsman in this department; give experience in detail, references and salary. Buffalo Forge Co., Buffalo, N. Y.

Foundry foreman wanted; one who is competent to take charge of a new shop located near New York, fitted with all improvements to do the heaviest class of work. Address "Marine," care AMERICAN MACHINIST.

Wanted—Three all-round machinists, accustomed to jig work and repairs on small automatic machines; permanent position for right

Help Wanted—Continued.

men; state experience and wages expected. Address "Worcester County," care AM. M.

Wanted—Machinists, first-class toolmakers, vise hands, planer and boring mill hands on heavy work, wood and metal patternmakers. Apply C. C. Tyler, Superintendent, Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Mechanical superintendent wanted, familiar with the manufacture of firearms on a large scale, possessing executive and mechanical ability. Address, stating age, experience and references, A., Box 2123, General Post Office, New York.

We are enlarging our works, and will shortly require an increased number of skilled mechanics; we invite application from pattern makers, moiders and machinists. Address the Westinghouse Machine Company, East Pittsburgh, Pa.

Jobbing pattern shop, employing from 15 to 30 men, needs competent foreman; must have experience in estimating; steady position to right party; state experience and wages expected; references required. Address P., care AMERICAN MACHINIST.

Wanted—Machinists; a few good vise men in a small town in Ohio to work on small, close work; good wages and steady work to competent and reliable men; in answering, state whether union or non-union. Address Box 84, AMERICAN MACHINIST.

Wanted—A man capable of taking charge of a fan motor department in a large and growing Western factory; also a man capable of taking charge of the detail department in the same factory, making bearing sleeves and dynamo trimmings. Box 131, AMER. MACH.

Operating superintendent wanted for electric lighting plant; city of 250,000 people; should have technical training and experience in handling men; must be well posted on steam economy; salary first year, $1,800. Box 127, AMERICAN MACHINIST.

Wanted—Machinists, boilermakers, blacksmiths, patternmakers, ship fitters, to go to San Francisco; good wages, continuous employment guaranteed by yearly contract; answer by mail only, stating age, experience and reference. Address C. T. B., Room 406, Park Row Building, New York City.

Wanted—Leading draftsman, experienced in working up designs for automatic machinery; a good opening is offered for first-class men who apply at once, stating full particulars as to experience, with what concern previously engaged, age, salary required, etc. Address "Continental," Box 123, AMER. MACHINIST.

Wanted—For large copper smelting works in Arizona, mechanical draftsman of thorough general experience in machine shop, foundry and boiler work; state where employed, for what periods, and on what classes of work; state age, whether married, and salary expected; permanent employment for suitable man. Address P. O. Box 396, New York City.

A young man, experienced in office work, familiar with the machine tool trade or from some commission house, who knows who makes most of the material supplies and tools used in machine manufacturing, with an aptitude for compiling card lists of such concerns and keeping same corrected and up to date; permanent position for the right party. Address Box 124, AMERICAN MACHINIST.

VALUABLE BOOKS.

Mechanical Movements, Powers, Devices and Appliances,
By Gardner D. Hiscox. **Price, $3.00**

Horseless Vehicles, Automobiles and Motor Cycles
By Gardner D. Hiscox. **Price, $3.00**

Gas Engine Construction,
By Parsell & Weed. **Price, $2.50**

Liquid Air and the Liquefaction of Gases,
By Prof. T. O'Conor Sloane. **Price, $2.50**

Gas, Gasoline and Oil Engines,
By Gardner D. Hiscox. **Price, $2.50**

Complete Electrical Library (5 volumes),
By Prof. T. O'Conor Sloane. **Price, $5.00**

Linear Perspective Self-Taught,
By H. T. C. Kraus, C. E. **Price, $2.50**

Inventor's Manual, How to Make a Patent Pay,
New, revised and enlarged edition. **Price, $1.00**

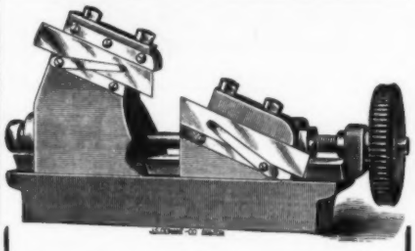
Saw Filing and Management of Saws,
By Robt. Grimshaw. **Price, $1.00**

Compressed Air and Its Applications, (shortly).

FREE { A special descriptive circular of any of these books sent on request. Our 96 page catalog of scientific and practical books, sent free to any address in the world on request.

NORMAN W. HENLEY & CO.,
PUBLISHERS,
15 Beekman St., NEW YORK.

R. POOLE & SON CO.
ENGINEERS, FOUNDERS AND MACHINISTS,
BALTIMORE, MD.
MANUFACTURERS AND DESIGNERS OF ALL KINDS OF
HEAVY MACHINERY,
REQUIRING FIRST CLASS WORKMANSHIP AND MATERIALS.
BAND, ROPE AND FLY WHEELS. FRICTION CLUTCHES. PULLEYS. SHAFTING AND HANGERS.
MACHINE MOLDED AND PLANED GEARING.
POOLE-LEFFEL TURBINE WATER-WHEELS.
CIRCULARS ON APPLICATION.



We Use This Tool Block

in our Cutting-Off and Centering Machines because it holds the blades securely at an angle with the line of travel and supports them out under the edges, giving a very strong SHEARING cut.

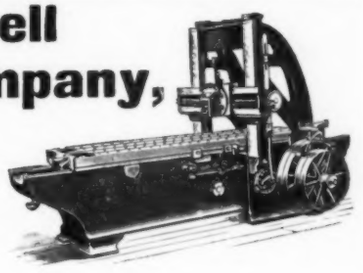
Any blade that's ground squarely must cut squarely in this block, and you who have lost time and temper in trying to set old style holders to cut squarely ought to send for our illustrated circular and follow the matter up a bit.

Hurlbut-Rogers Machine Co.,
SOUTH SUDBURY, MASS.

Agents: Schuchardt & Schutte, Berlin, Vienna, Cologne, Brussels, Stockholm and St. Petersburg. Chas. Churchill & Co., Ltd., London and Birmingham.

Woodward & Powell Planer Company,

WORCESTER, MASS.



U. Baird Machinery Co., Pittsburgh, Pa.
Parke & Lacy Co., San Francisco, Cal.
Robinson & Carey Co., St. Paul, Minn.
Manning, Maxwell & Moore, Chicago, Ill.
Manning, Maxwell & Moore, New York City.

The worn-out wood paving blocks from the streets of Glasgow are sold to the English toy makers, the economy resulting being an important factor in the successful competition with German makers, who, presumably, use new but inferior material.

The First Annual Automobile Exhibition, under the auspices of the Chicago Automobile Club and the National Association of Automobile Manufacturers, will be held in the Coliseum Building, Chicago, March 1 to 8, inclusive, 1902. S. A. Miles, who managed last year's automobile exhibition in the same building, will assume the general direction of the show. His address is 324 Dearborn street.

Manufacturers.

The Cleveland (O.) Wire Spring Company expects to enlarge its plant.

A new factory is to be built by the Glens Falls (N. Y.) Box Company.

The Knoxville (Tenn.) Iron Company is expected to build a new plant.

The erection of a municipal asphalt plant is contemplated at Detroit, Mich.

Ryan Bros., Leavenworth, Kan., are to form a company to establish a packing plant.

The Hudson Valley Railroad Company will erect a machine shop in Stillwater, N. Y.

The factory of the Texarkana Handle Company, Texarkana, Tex., has been burned.

The factory of the Fox & Mason Furniture Company, Corunna, Mich., has been burned.

The Kane-Maloney Iron & Steel Company, Pittsburgh, Pa., has bought land for an addition.

The Allegheny Valley Railroad will build machine and planing shop additions at Verona, Pa.

The Carnegie armor plate plant of the United States Steel Corporation is soon to be enlarged.

The Franklin Steel Casting Company, Franklin, Pa., is adding another building to its plant.

A disastrous fire has occurred at the plant in Allegheny, Pa., of the Pittsburgh Clay Pot Company.

Love Brothers, founders and machinists, Aurora, Ill., are putting up one or more new buildings.

An addition is planned for at the plant of the New England Watch Company, Waterbury, Conn.

John J. Marten & Co., Detroit, Mich., have lost their sash and door factory by fire, but will rebuild.

The Syracuse Silk Company, Syracuse, N. Y., is considering plans for rebuilding its burned mill.

A cold storage plant is to be erected in Reading, Pa., for the Reading Cold Storage & Ice Company.

The Ohio Falls Iron Company, New Albany, Ind., may build a sheet iron mill within a few months.

The Champion Rivet Company, Cleveland, O., has decided to erect a plant in the Pittsburgh district.

Additions are to be made to the plant of the Union Metallic Cartridge Company, of Bridgeport, Conn.

Citizens of Norwood, O., have voted $50,000 bonds to increase the capacity of their municipal electric plant.

The sawmill of the Loomis & Hart Manufacturing Company, Chattanooga, Tenn., has been destroyed by fire.

Boll Bros. Manufacturing Company, Harrisburg, Pa., maker of wire matresses, etc., will build another addition.

The Central Sugar Company, with a capital of $300 000, is arranging to build a factory at Carrolton, Mich.

The Star Graphite Company is erecting a graphite mill and refinery at Elizabeth Lake, Los Angeles County, Cal.

The Goldie Manufacturing Company has decided to rebuild the burned portion of its hoop factory at Bay City, Mich.

James Boyer, of Dixon, Ill., is preparing to open a repair machine shop, and has been purchasing tools for same.

A 1,500,000-bushel elevator is to be built at Point Edward by the Botsford-Jenks Company, of Port Huron, Mich.

Additions will be made to the plant of the Modes-Turner Glass Company, manufacturer of bottles, Terre Haute, Ind.

S. B. Steece, postmaster of Ironton, O., has organized a company to manufacture cement. Work on the plant has begun.

A permit has been issued to the Turner Worsted Company, at 1742 Broadway, Cleveland, O., for an addition to its factory.

The Selle Gear Company, manufacturer of wagon gear, Akron, O., will increase the capacity of its blacksmithing department.

Harry H. Bennett, Findlay, O., is building an addition to his shop, and new machinery will be added for building automobiles.

Application has been made by the Pittsburgh Drop Forge Tool & Die Company, Pittsburgh, Pa., for papers of incorporation.

The factory of Moseley & Stoddard Manufacturing Company, manufacturer of creamery supplies, Rutland, Vt., has been burned.

The Vaughn Machine Company, of Peabody, Mass., manufacturer of hide and leather working machinery, is increasing its capacity.

The Keighley-Mullen Company, manufacturer of shoes, has decided to move its manufactory from Vineland, N. J., to Bridesburg, Pa.

The Minneapolis & St. Louis Railway has started work at its Cedar Lake shops, which will include an extension to the machine shop.

The Union Steel Company, which has a new wire and rod plant at Donora, Pa., is planning for improvements that will cost $500,000.

The Northwestern Malleable Iron Company, Milwaukee, Wis., has purchased land, which will be used by it for extensions to the plant.

The Page Woven Wire Fence Company, of Adrian, Mich., is said to be contemplating increasing the capacity of its plant at Monessen, Pa.

The Chicago, Milwaukee & St. Paul Railway Company has been granted a building permit for a $2,000 machine shop at Kansas City, Mo.

A two-story factory, 40x95 feet, and one-story foundry, 40x80 feet, are to be built in Hagerstown, Md., for the Metallic Bedstead Company.

A plant to cost $100,000 will be built for the Matthews Woven Wire Fence Company adjoining the Union Steel Company's works, at Donora, Pa.

The Westmoreland Railway Company, Greensburg, Pa., will soon begin the erection of an auxiliary electric power plant of about 600 horse-power.

Work is progressing on the new buildings of the Pennsylvania Steel Company at Steelton Heights, Pa. The new bridge shop is rapidly nearing completion.

Factories:
PROVIDENCE, R. I.
PAWTUCKET, R. I.
BEAVER FALLS, PA.
PATERSON, N. J.
KENT, OHIO.
ANDERSON, IND.

FILES AND RASPS

Leading Brands:
NICHOLSON.
KEARNEY & FOOT.
AMERICAN.
GREAT WESTERN.
ARCADE.
J. B. SMITH.
McCLELLAN.
EAGLE.
X. F.
GOLD MEDAL.

ALL CONTROLLED BY THE

NICHOLSON FILE CO.

Address all Orders and Correspondence to the
Main Office at PROVIDENCE, R. I., U.S.A.

FINE SCREW PLATES.
"LIGHTNING" AND "GREEN RIVER."
Taps, Dies, Reamers, Tap Wrenches, Bolt Cutters, Drilling Machines, Punching Presses and other labor saving Tools. Send for Catalog.
WILEY & RUSSELL MFG. CO., Greenfield, Mass., U.S.A.
Agents in London, SELIG, SONNENTHAL & Co., 85 Queen Victoria Street.

This Post Radial Drill

Is a mighty handy tool and will increase your drilling capacity out of all proportion to its cost. Its special usefulness lies in the rapid drilling of a number of holes in a single piece at one setting, and it's a winner on this class of work. It's rigid and accurately fitted, and all wearing parts are bushed with phosphor bronze. Price is low, too. Ask for the other details.

Drills to center of a 96-inch circle.

The S. M. York Machinery Co., CLEVELAND, O., U.S.A.

MAYER & COMPANY
MANUFACTURERS OF
NONE GENUINE UNLESS STAMPED ★MAYER & CO. OR ★M. & CO.
THE HIGHEST AWARD IN THE WORLD
NOT IN THE TRUST
GOLD MEDAL FILES
GUARANTEED TO OUT WEAR ANY OTHER FILE MADE
20TH AND ALLEGHENY AVE. SUCCESS BEGETS IMITATORS PHILA. PA.